AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE	OF PAGES
N/A	1	

2. AMENDMENT/MODIFICATION NO.	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
0001	21 July 01		DACW09-01-B-0007

6. ISSUED BY CODE

U.S. ARMY ENGINEER DISTRICT, Los Angeles
P.O. Box 532711
Los Angeles, California 90053-2325

7. ADMINISTERED BY *(If other than Item 6)* CODE

8. NAME AND ADDRESS OF CONTRACTOR *(No., street, county, State and ZIP Code)*

CODE FACILITY CODE

(√)	
X	9A. AMENDMENT OF SOLICITATION NO. DACW09-01-B-0007
	9B. DATED *(SEE ITEM 11)* 31 July 2001 (Bid Opening)
	10A. MODIFICATION OF CONTRACTS/ORDER NO.
	10B. DATED *(SEE ITEM 13)*

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☒ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☒ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning 1 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(√)	
	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER *(Specify type of modification and authority)*

E. IMPORTANT: Contractor ☐ is not, ☐ is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

R-4 DETENTION BASIN AND CHANNEL, LAS VEGAS WASH AND TRIBUTARIES (TROPICANA AND FLAMINGO WASHES), CLARK COUNTY, NEVADA

- CONTINUED ON BACK OF SHEET -

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)*	
15B. CONTRACTOR/OFFEROR *(Signature of person authorized to sign)*	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY *(Signature of Contracting Officer)*	16C. DATE SIGNED

R-4 DETENTION BASIN AND CHANNEL, LAS VEGAS WASH AND TRIBUTARIES (TROPICANA AND FLAMINGO WASHES), CLARK COUNTY, NEVADA (Continued)

REPLACE the following Sections with the enclosed:

Section 00010
Section 00800
Section 00850
Section 01200
Section 01250
Section 01451 (Including Figures NOS 1 AND 2)
Section 02250
Section 02316
Section 02910
Section 02921
Section 03101
Section 03301
Section 05500

REPLACE the following Drawings with the enclosed:

196/671
196/672
196/673
196/675
196/676
196/677
196/678
196/698
196/699
196/700
196/702
196/703
196/709
196/712
196/713
196/715
196/716
196/725
196/739
196/740
196/741
196/742
196/743

SECTION 00010

SUPPLIES OR SERVICES AND PRICES/COSTS

PART 1 GENERAL

1.1 **Base Bid**

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
0001	TRAFFIC CONTROL	1	Job	LS	__.__
0002	DIVERSION AND CONTROL OF WATER	1	Job	LS	__.__
0003	CONSTRUCTION WATER	1	Job	LS	__.__
0004	CLEAR SITE AND REMOVE OBSTRUCTIONS	1	Job	LS	__.__
0005	STRIP AND STOCKPILE TOP SOIL	31,600	m^3	__.__	__.__
0006	EXCAVATION, DETENTION BASIN	158,710	m^3	__.__	__.__
0007	EXCAVATION, CHANNEL	69,700	m^3	__.__	__.__
0008	COMPACTED FILL, DAM EMBANKMENT	126,620	m^3	__.__	__.__
0009	COMPACTED FILL, CHANNEL	18,000	m^3	__.__	__.__
0010	COMPACTED FILL, ROADWAYS	2,850	m^3	__.__	__.__
0011	MISCELLANEOUS FILL	32,000	m^3	__.__	__.__
0012	FILTER MATERIAL	1,270	m^3	__.__	__.__
0013	DRAIN MATERIAL	3,240	m^3	__.__	__.__
0014	DETENTION BASIN DUST PALLIATIVE	5.9	HA	__.__	__.__
0015	RIPRAP PLACEMENT FOR SPILLWAY TOE	4,600	t	__.__	__.__
0016	REINFORCED CONCRETE PIPE - 1.372 m DIA.	5	m	__.__	__.__
0017	REINFORCED CONCRETE PIPE - 1.067 m DIA.	20	m	__.__	__.__
0018	REINFORCED CONCRETE PIPE - 0.914 m DIA.	21	m	__.__	__.__
0019	REINFORCED CONCRETE PIPE - 0.762 m DIA.	25	m	__.__	__.__
0020	REINFORCED CONCRETE PIPE - 0.610 m DIA.	42	m	__.__	__.__

0021	REINFORCED CONCRETE PIPE - 0.457 m DIA.	34	m	__.__	__.__
0022	STEEL SLEEVE, 457 mm DIA	23	m	__.__	__.__
0023	STEEL SLEEVE, 610 mm DIA	63	m	__.__	__.__
0024	STEEL SLEEVE, 1.067 m DIA	77	m	__.__	__.__
0025	CONCRETE ENCASED DUCT BANK, FLAMINGO ROAD	21	m	__.__	__.__
0026	CONCRETE ENCASED DUCT BANK, LOOP ROADS	46	m	__.__	__.__
0027	203 mm PVC SCH. 40 SLEEVE	67	m	__.__	__.__
0028	610 mm PVC SLEEVE	15	m	__.__	__.__
0029	ADJUST MANHOLE FRAME AND COVER	6	ea	__.__	__.__
0030	CONCRETE ENCASED 203 mm SEWER	32	m	__.__	__.__
0031	203 mm PVC SEWER	620	m	__.__	__.__
0032	102 mm PVC SDR 35 SEWER	24	m	__.__	__.__
0033	SANITARY SEWER MANHOLE	10	ea	__.__	__.__
0034	305 mm WATER	248	m	__.__	__.__
0035	CONCRETE ENCASE 305 mm WATER	16	m	__.__	__.__
0036	AGGREGATE BASE COURSE	7,750	t	__.__	__.__
0037	ASPHALT CONCRETE PAVEMENT	3,448	t	__.__	__.__
0038	TYPE "A" GLUE DOWN CURB	67	m	__.__	__.__
0039	CHAIN LINK FENCING(9 gage fabric)	1,750	m	__.__	__.__
0040	CHAIN LINK FENCING (11 gage fabric)	3,290	m	__.__	__.__
0041	TEMPORARY CHAIN LINK FENCING WITH (11 gage fabric) BARBED WIRE	383	m	__.__	__.__
0042	4 m CHAIN LINK DOUBLE SWING GATE	8	ea	__.__	__.__
0043	4 m TEMPORARY CHAIN LINK DOUBLE SWING GATE W/ 3 STRAND BARBED WIRE	2	ea	__.__	__.__
0044	1.118 m CHAIN LINK SINGLE SWING GATE	6	ea	__.__	__.__
0045	1.5 m CHAIN LINK SINGLE SWING GATE	6	ea	__.__	__.__
0046	3.048 m CHAIN LINK SINGLE SWING GATE	6	ea	__.__	__.__

0047	TEMPORARY POLYETHYLENE FENCING	1,754	m	__.__	__.__
0048	102 mm BOLLARD	28	ea	__.__	__.__
0049	PIPE ACCESS GATE	4	ea	__.__	__.__
0050	LADDER SYSTEMS	1	Job	LS	__.__
0051	PIPE SAFETY RAILING	4,670	m	__.__	__.__
0052	REINFORCED CONCRETE CHANNEL SLAB	**3,273**	**m^3**	__.__	__.__
0053	REINFORCED CONCRETE CHANNEL WALLS	3,951	m^3	__.__	__.__
0054	REINFORCED CONCRETE TOP SLAB	233	m^3	__.__	__.__
0055	CONCRETE REINFORCEMENT, CHANNEL	765	t	__.__	__.__
0056	REINFORCED CONCRETE CONFLUENCE STRUCTURE #1 STATION 16+49.629 TO STATION 17+19.000	1	Job	LS	__.__
0057	REINFORCED CONCRETE CONFLUENCE STRUCTURE #2 STATION 33+04.394 TO STATION 33+19.936	1	Job	LS	__.__
0058	REINFORCED CONCRETE ACCESS RAMP #1 STATION 17+29.111 TO STATION 17+83.254	1	Job	LS	__.__
0059	REINFORCED CONCRETE ACCESS RAMP #2 STATION 30+66.624 TO STATION 31+25.208	1	Job	LS	__.__
0060	OUTLET STRUCTURE	1	Job	LS	__.__
0061	REINFORCED CONCRETE SLOTTED CHAMBER 0.610 RCP	1	ea	__.__	__.__
0062	REINFORCED CONCRETE SLOTTED CHAMBER 0.762 RCP	2	ea	__.__	__.__
0063	REINFORCED CONCRETE SLOTTED CHAMBER 0.914 RCP	2	ea	__.__	__.__
0064	REINFORCED CONCRETE SLOTTED CHAMBER 1.372 RCP	1	ea	__.__	__.__
0065	STORM DRAIN MANHOLE	1	ea	__.__	__.__
0066	ROLLER COMPACTED CONCRETE (RCC) FOR SPILLWAY AND INFLOW STRUCTURE	18,100	m^3	__.__	__.__
0067	PORTLAND CEMENT FOR RCC FOR SPILLWAY AND INFLOW STRUCTURE	3,190	t	__.__	__.__

0068	POZZOLAN FOR RCC FOR SPILLWAY AND INFLOW STRUCTURE	800	t	__.__	__.__
0069	DETENTION BASIN STILLING WELL	1	Job	LS	___.__
0070	CHANNEL STILLING WELL	1	Job	LS	___.__
0071	WEEPHOLE SYSTEM	1	Job	LS	___.__
0072	SEDIMENT STAFF GAGE	3	ea	__.__	__.__
0073	BASIN DEPTH GAGE	1	Job	LS	__.__
0074	MULTI-USE TRAIL PRE-EMERGENT HERBICIDE/DUST PALLIATIVE	5.1	HA	__.__	__.__
0075	SALVAGE, STORE, MAINTAIN, AND PLACE HEDGEHOG CACTUS AT R-4	158	ea	__.__	__.__
0076	SALVAGE, STORE, MAINTAIN, AND PLACE BARREL CACTUS AT R-4	22	ea	__.__	__.__
0077	SALVAGE, STORE, MAINTAIN, AND PLACE JOSHUA TREE AT R-4	53	ea	__.__	__.__
0078	SALVAGE, STORE, MAINTAIN, AND PLACE MOHAVE YUCCA AT R-4 SITE	417	ea	__.__	__.__
0079	SALVAGE, STORE, MAINTAIN, AND PLACE WHITE BURSAGE AT R-4	2,770	ea	__.__	__.__
0080	SALVAGE, STORE, MAINTAIN, AND PLACE CREOSOTE BUSH AT R-4	1,385	ea	__.__	__.__
0081	SALVAGE AND TRANSPORT FOR BLM HEDGEHOG CACTUS	**33**	**ea**	__.__	__.__
0082	SALVAGE AND TRANSPORT FOR BLM BARREL CACTUS	20	ea	__.__	__.__
0083	SALVAGE AND TRANSPORT FOR BLM JOSHUA TREE	3	ea	__.__	__.__
0084	SALVAGE AND TRANSPORT FOR BLM MOHAVE YUCCA	88	ea	__.__	__.__
0085	SALVAGE HEDGEHOG CACTUS AT R-4, TRANSPORT AND PLANT AT RED ROCK OUTLET CHANNEL	103	ea	__.__	__.__
0086	SALVAGE JOSHUA TREE AT R-4, TRANSPORT AND PLANT AT RED ROCK OUTLET CHANNEL	24	ea	__.__	__.__
0087	SALVAGE MOJAVE YUCCA AT R-4, TRANSPORT AND PLANT AT RED ROCK OUTLET CHANNEL	270	ea	__.__	__.__

0088	SALVAGE WHITE BURSAGE AT R-4, TRANSPORT AND PLANT AT RED ROCK OUTLET CHANNEL	1,800	ea	__.__	__.__
0089	SALVAGE CREOSOTE BUSH AT R-4, TRANSPORT AND PLANT AT RED ROCK OUTLET CHANNEL	900	ea	__.__	__.__
0090	PROVIDE BROWSE PROTECTION AT RED ROCK OUTLET CHANNEL	2,700	ea	__.__	__.__
0091	LARGE BENCH SLOPE TREATMENT	0.21	HA	__.__	__.__
0092	PLACE TOPSOIL TO FINISH GRADE	5,657	m^3	__.__	__.__
0093	SEEDING AND FERTILIZATION	2.77	HA	__.__	__.__
0094	PROVIDE AND PLACE BOULDER GROUPS (3 PER GROUP)AT R-4	243	ea	__.__	__.__
0095	PROVIDE PLANT STORAGE IRRIGATION DURING CONSTRUCTION	1	Job	LS	__.__
0096	PROVIDE IRRIGATION FOR 1 YEAR AFTER CONSTRUCTION	1	Job	LS	__.__
0097	PROVIDE BROWSE PROTECTION AT R-4 SITE	4,322	ea	__.__	__.__
0098	SIMULATED DESERT VARNISH ROCK COLOR MITIGATION	0.81	HA	__.__	__.__
0099	CONCRETE CHANNEL STAIN/SEALER	12,700	m^2	__.__	__.__
0100	SOIL STABILIZER	2.77	HA	__.__	__.__
0101	PREPARE AS-BUILT DRAWINGS	1	Job	__.__	__.__
0102	**CONCRETE FOR TEST SECTIONS**	**382**	**m^3**	__.__	__.__
0103	**PORTLAND CEMENT FOR TEST SECTIONS**	**166**	**t**	__.__	__.__
0104	**POZZOLAN FOR TEST SECTIONS**	**25**	**t**	__.__	__.__
0105	**WATER-REDUCING ADMIXTURE FOR TEST SECTIONS**	**444**	**L**	__.__	__.__
0106	**LITHIUM BASED ADMIXTURE FOR TEST SECTIONS**	**1,685**	**L**	__.__	__.__

SUBTOTAL ESTIMATED AMOUNT OF BASE BID (Line Items 0001-0106) **$_____.__**

1.2 Alternate Bid Items

1.2.1 Alternative 1 Riprap Upstream Slope Protection

0107	**RIPRAP FILTER MATERIAL**	**1,700**	**m^3**	__.__	__.__
0108	**RIPRAP REPLACEMENT**	**9,700**	**t**	__.__	__.__

SUBTOTAL ESTIMATED AMOUNT OF ALTERNATIVE 1 (Line Items 0107-0108) **$**_____.__

1.2.2 Alternative 2 RCC or SC Upstream Slope Protection

0109	**ADDITIONAL COMPACTED FILL, DAM EMBANKMENT**	**2,860**	**m^3**	__.__	__.__
0110	**RCC OR SC UPSTREAM SLOPE PROTECTION**	**4,580**	**m^3**	__.__	__.__
0111	**CEMENT FOR RCC OR SC UPSTREAM SLOPE PROTECTION**	**565**	**t**	__.__	__.__
0112	**POZZOLAN FOR RCC OR SC UPSTREAM SLOPE PROTECTION**	**140**	**t**	___.__	__.__

SUBTOTAL ESTIMATED AMOUNT OF ALTERNATIVE 2 (Line Items 0109-0112) **$**_____.__

NOTE: Prices must be submitted on all individual items of the Base Bid (Line Items 0001-0106), otherwise the bid will be considered non-responsive and will be rejected and on either Alternative 1 (Line Items 0107-0108) or Alternative 2 (Line Items 0109-0112) NOT BOTH.
Any bidder who submits a bid for Both Alternative 1 and Alternative 2 will be considered non-responsive and will be rejected.

Abbreviations:

m = meter
m^2 = square meter
m^3 = cubic meter
t = metric ton (1000 kilograms)
ea = each
LS = lump sum
HA = hectare
L = liter

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)
-- End of Section --

SECTION 00800 Special Contract Requirements

SECTION 00800

52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984)

The Contractor shall be required to (a) commence work under this contract within 1 calendar day after the date the Contractor receives **each of** the notice to proceed**s**, (b) prosecute the work diligently, and (c) complete the entire work **, R-4 Channel and R-4 Detention Basin,** ready for use not later than 450 calendar days after the Contractor received the Notice to Proceed **for the R-4 Channel Work**. The Notice of Award constitutes the Notice to Proceed **for the R-4 Channel Work**. The Notice to Proceed will be provided at the time of notice of award. **The Notice to Proceed for the R-4 Detention Basin Work on BLM lands will be authorized by letter from the Government during the period from 01 October 2001 and 07 October 2001, inclusive.** The time stated for completion shall include final cleanup of the premises.

(End of clause)

52.211-12 LIQUIDATED DAMAGES--CONSTRUCTION (SEP 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, the Contractor shall pay liquidated damages to the Government in the amount of $1,350.00 for each calendar day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(End of clause)

52.211-18 VARIATION IN ESTIMATED QUANTITY (APR 1984)

If the quantity of a unit-priced item in this contract is an estimated quantity and the actual quantity of the unit-priced item varies more than 15 percent above or below the estimated quantity, an equitable adjustment in the contract price shall be made upon demand of either party. The equitable adjustment shall be based upon any increase or decrease in costs due solely to the variation above 115 percent or below 85 percent of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Contractor may request, in writing, an extension of time, to be received by the Contracting Officer within 10 days from the beginning of the delay, or within such further period as may be granted by the Contracting Officer before the date of final settlement of the contract. Upon the receipt of a written request for an extension, the Contracting Officer shall ascertain the facts and make an adjustment for extending the completion date as, in the judgement of the Contracting Officer, is justified.

52.222-23 NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY FOR CONSTRUCTION (FEB 1999)

(a) The offeror's attention is called to the Equal Opportunity clause and the Affirmative Action Compliance Requirements for Construction clause of this solicitation.

(b) The goals for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Goals for minority participation for each trade	Goals for female participation for each trade
13.9%	6.9%

These goals are applicable to all the Contractor's construction work performed in the covered area. If the Contractor performs construction work in a geographical area located outside of the covered area, the Contractor shall apply the goals established for the geographical area where the work is actually performed. Goals are published periodically in the Federal Register in notice form, and these notices may be obtained from any Office of Federal Contract Compliance Programs office.

(c) The Contractor's compliance with Executive Order 11246, as amended, and the regulations in 41 CFR 60-4 shall be based on (1) its implementation of the Equal Opportunity clause, (2) specific affirmative action obligations required by the clause entitled "Affirmative Action Compliance Requirements for Construction," and (3) its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade. The Contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor, or from project to project, for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, Executive Order 11246, as amended, and the regulations in 41 CFR 60-4. Compliance with the goals will be measured against the total work hours performed.

(d) The Contractor shall provide written notification to the Deputy Assistant Secretary for Federal Contract Compliance, U.S. Department of Labor, within 10 working days following award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the --

(1) Name, address, and telephone number of the subcontractor;

(2) Employer's identification number of the subcontractor;

(3) Estimated dollar amount of the subcontract;

(4) Estimated starting and completion dates of the subcontract; and

(5) Geographical area in which the subcontract is to be performed.

(e) As used in this Notice, and in any contract resulting from this solicitation, the "covered area" is Clark County, Nevada.

52.228-12 Prospective Subcontractor Requests for Bonds. (OCT 1995)

In accordance with Section 806(a)(3) of Pub. L. 102-190, as amended by Sections 2091 and 8105 of Pub. L. 103-355, upon the request of a prospective subcontractor or supplier offering to furnish labor or material for the performance of this contract for which a payment bond has been furnished to the Government pursuant to the Miller Act, the Contractor shall promptly provide a copy of such payment bond to the requester.

52.228-14 IRREVOCABLE LETTER OF CREDIT (DEC 1999)

(a) “Irrevocable letter of credit” (ILC), as used in this clause, means a written commitment by a federally insured financial institution to pay all or part of a stated amount of money, until the expiration date of the letter, upon presentation by the Government (the beneficiary) of a written demand therefor. Neither the financial institution nor the offeror/Contractor can revoke or condition the letter of credit.

(b) If the offeror intends to use an ILC in lieu of a bid bond, or to secure other types of bonds such as performance and payment bonds, the letter of credit and letter of confirmation formats in paragraphs (e) and (f) of this clause shall be used.

(c) The letter of credit shall be irrevocable, shall require presentation of no document other than a written demand and the ILC (including confirming letter, if any), shall be issued/confirmed by an acceptable federally insured financial institution as provided in paragraph (d) of this clause, and--

(1) If used as a bid guarantee, the ILC shall expire no earlier than 60 days after the close of the bid acceptance period;

(2) If used as an alternative to corporate or individual sureties as security for a performance or payment bond, the offeror/Contractor may submit an ILC with an initial expiration date estimated to cover the entire period for which financial security is required or may submit an ILC with an initial expiration date that is a minimum period of one year from the date of issuance. The ILC shall provide that, unless the issuer provides the beneficiary written notice of non-renewal at least 60 days in advance of the current expiration date, the ILC is automatically extended without amendment for one year from the expiration date, or any future expiration date, until the period of required coverage is completed and the Contracting Officer provides the financial institution with a written statement waiving the right to payment. The period of required coverage shall be:

(i) For contracts subject to the Miller Act, the later of--

(A) One year following the expected date of final payment;

(B) For performance bonds only, until completion of any warranty period; or

(C) For payment bonds only, until resolution of all claims filed against the payment bond during the one-year period following final payment.

(ii) For contracts not subject to the Miller Act, the later of--

(A) 90 days following final payment; or

(B) For performance bonds only, until completion of any warranty period.

(d) Only federally insured financial institutions rated investment grade or higher shall issue or confirm the ILC. The offeror/Contractor shall provide the Contracting Officer a credit rating that indicates the financial institution has the required rating(s) as of the date of issuance of the ILC. Unless the financial institution issuing the ILC had letter of credit business of less than $25 million in the past year, ILCs over $5 million must be confirmed by another acceptable financial institution that had letter of credit business of less than $25 million in the past year.

(e) The following format shall be used by the issuing financial institution to create an ILC:

_____

[Issuing Financial Institution's Letterhead or Name and Address]

Issue Date _____

IRREVOCABLE LETTER OF CREDIT NO. _____

Account party's name _____

Account party's address _____

For Solicitation No. _____(for reference only)

TO: [U.S. Government agency]

[U.S. Government agency's address]

1. We hereby establish this irrevocable and transferable Letter of Credit in your favor for one or more drawings up to United States $_____. This Letter of Credit is payable at [issuing financial institution's and, if any, confirming financial institution's] office at [issuing financial institution's address and, if any, confirming financial institution's address] and expires with our close of business on _____, or any automatically extended expiration date.

2. We hereby undertake to honor your or the transferee's sight draft(s) drawn on the issuing or, if any, the confirming financial institution, for all or any part of this credit if presented with this Letter of Credit and confirmation, if any, at the office specified in paragraph 1 of this Letter of Credit on or before the expiration date or any automatically extended expiration date.

3. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this Letter of Credit that it is deemed to be automatically extended without amendment for one year from the expiration date hereof, or any future expiration date, unless at least 60 days prior to any expiration date, we notify you or the transferee by registered mail, or other receipted means of delivery, that we elect not to consider this Letter of Credit renewed for any such additional period. At the time we notify you, we also agree to notify the account party (and confirming financial institution, if any) by the same means of delivery.

4. This Letter of Credit is transferable. Transfers and assignments of proceeds are to be effected without charge to either the beneficiary or the transferee/assignee of proceeds. Such transfer or assignment shall be only at the written direction of the Government (the beneficiary) in a form satisfactory to the issuing financial institution and the confirming financial institution, if any.

5. This Letter of Credit is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent therewith, to the laws of _____ [state of confirming financial institution, if any, otherwise state of issuing financial institution].

6. If this credit expires during an interruption of business of this financial institution as described in Article 17 of the UCP, the financial institution specifically agrees to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

_____

[Issuing financial institution]

(f) The following format shall be used by the financial institution to confirm an ILC:

_____
[Confirming Financial Institution's Letterhead or Name and Address]

(Date) _____

Our Letter of Credit Advice Number _____

Beneficiary: _____ [U.S. Government agency]

Issuing Financial Institution: _____

Issuing Financial Institution's LC No.: _____

Gentlemen:

1. We hereby confirm the above indicated Letter of Credit, the original of which is attached, issued by _____ [name of issuing financial institution] for drawings of up to United States dollars _____/U.S. $_____ and expiring with our close of business on _____ [the expiration date], or any automatically extended expiration date.

2. Draft(s) drawn under the Letter of Credit and this Confirmation are payable at our office located at _____.

3. We hereby undertake to honor sight draft(s) drawn under and presented with the Letter of Credit and this Confirmation at our offices as specified herein.

4. [This paragraph is omitted if used as a bid guarantee, and subsequent paragraphs are renumbered.] It is a condition of this confirmation that it be deemed automatically extended without amendment for one year from the expiration date hereof, or any automatically extended expiration date, unless:

(a) At least 60 days prior to any such expiration date, we shall notify the Contracting Officer, or the transferee and the issuing financial institution, by registered mail or other receipted means of delivery, that we elect not to consider this confirmation extended for any such additional period; or

(b) The issuing financial institution shall have exercised its right to notify you or the transferee, the account party, and ourselves, of its election not to extend the expiration date of the Letter of Credit.

5. This confirmation is subject to the Uniform Customs and Practice (UCP) for Documentary Credits, 1993 Revision, International Chamber of Commerce Publication No. 500, and to the extent not inconsistent therewith, to the laws of _____ [state of confirming financial institution].

6. If this confirmation expires during an interruption of business of this financial institution as described in Article 17 of the UCP, we specifically agree to effect payment if this credit is drawn against within 30 days after the resumption of our business.

Sincerely,

_____

[Confirming financial institution]

(g) The following format shall be used by the Contracting Officer for a sight draft to draw on the Letter of Credit:

SIGHT DRAFT

_____

[City, State]

(Date) _____

[Name and address of financial institution]

Pay to the order of _____ [Beneficiary Agency] _____ the sum of United States $_____. This draft is drawn under Irrevocable Letter of Credit No. _____.

_____

[Beneficiary Agency]

By: _____

(End of clause)

52.228-15 Performance and Payment Bonds--Construction (JUL 2000)-

(a) Definitions. As used in this clause--

Original contract price means the award price of the contract; or, for requirements contracts, the price payable for the estimated total quantity; or, for indefinite-quantity contracts, the price payable for the specified minimum quantity. Original contract price does not include the price of any options, except those options exercised at the time of contract award.

(b) Amount of required bonds. Unless the resulting contract price is $100,000 or less, the successful offeror shall furnish performance and payment bonds to the Contracting Officer as follows:

(1) Performance bonds (Standard Form 25). The penal amount of performance bonds at the time of contract award shall be 100 percent of the original contract price.

(2) Payment Bonds (Standard Form 25-A). The penal amount of payment bonds at the time of contract award shall be 100 percent of the original contract price.

(3) Additional bond protection. (i) The Government may require additional performance and payment bond protection if the contract price is increased. The increase in protection generally will equal 100 percent of the increase in contract price.

(ii) The Government may secure the additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(c) Furnishing executed bonds. The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, within the time period specified in the Bid Guarantee provision of the solicitation, or otherwise specified by the Contracting Officer, but in any event, before starting work.

(d) Surety or other security for bonds. The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable security such as postal money order, certified check, cashier's check, irrevocable letter of credit, or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Treasury Circular 570 is published in the Federal Register or may be obtained

from the U.S. Department of Treasury, Financial Management Service, Surety Bond Branch, 401 14th Street, NW, 2nd Floor, West Wing, Washington, DC 20227.

(e) Notice of subcontractor waiver of protection (40 U.S.C. 270b(c). Any waiver of the right to sue on the payment bond is void unless it is in writing, signed by the person whose right is waived, and executed after such person has first furnished labor or material for use in the performance of the contract.

(End of clause)

52.0001-4001 CONTRACT ADMINISTRATION DATA

The Contract Administration Office for this contract subsequent to award is:

Department of the Army
Los Angeles District, Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053-2325

ATTN: Ms. Diane Watkins
Telephone No: Area Code (213) 452-3251

Payment will be made by:

USACE Finance Center
ATTN: CEFC-AO-P
5270 Integrity Drive
Millington, TN 38054-5005

Submit Invoices to:

Mr. Robert Caskie
Tropicana Project Office
4440 South Durango Drive, Suite D
Las Vegas, NV 89147

52.28-4001 REQUIRED INSURANCE

The Contractor shall procure and obtain during the entire period of his performance under this contract the following minimum insurance:

a. General Public Liability insurance for bodily injury and property damage with minimum limits of $1,000,000 combined single limit per occurrence and $1,000,000 annual aggregate for bodily injury to or death, personal injury and property damage.

b. Automobile Liability insurance for bodily injury and property damage with minimum limits of $1,000,000 combined single limit for each occurrence and $1,000,000 annual aggregate.

c. Either Workman's Compensation or Employer's Liability insurance with a minimum limit of $1,000,000.

In every case the insurance coverage shall amount to at least the limits stated above. However, where the Financial Responsibility Compulsory Insurance Law of the State in which the installation is located requires higher limits, the Automobile Liability Insurance Policy should provide coverage of at least those limits. County of Clark, a political subdivision of the state of Nevada, Clark County Regional Flood Control District, and Montgomery Watson shall be named as additional insured parties and all policies issued in performance of work under this contract.

The Contractor does hereby agree to indemnify, defend, and save harmless Clark County, Clark County Regional Flood Control District, U.S. Army Corps of Engineers and Montgomery Watson from loss, damage, liability, costs, or expense to the proportionate extent caused by the Contractor, his employees, agents, or consultants and/or consultants arising out of its performance of this contract, including, but not limited to the negligent acts, errors, omissions, or intentional misconduct of the Contractor, its employees, agents or consultants and/or subconsultants in connection with this contract.

Contractor further does hereby agree, as a precaution to the performance of any work under this contract and as a precaution to any obligation of Clark County to make any payment under this contract, to provide Clark County with a certificate and/or a certificate issued by the State Industrial Insurance System (SIIS) in accordance with Nevada Revised Statute 616.280.

Contractor agrees to maintain required workers compensation throughout the entire term of the contract. If Contractor does not maintain coverage throughout the entire term of the contract, Contractor agrees that Owner may, at any time the coverage is not maintained by Contractor, order the Contractor to stop work, assess liquidated damages as defined herein, suspend the contract, or terminate the contract. For each six month period this contract is in effect, Contractor agrees, prior to the expiration of the six month period, make another written request to SIIS for the provisions of a certificate and notice of lapse in or nonpayment of coverage. If Contractor does not make the request or does not provide the certificate before the expiration of the six month period, Contractor agrees that owner may order the Contractor to stop work, suspend the contract or terminate the contract.

Prior to the commencement of work hereunder, the Contractor shall furnish to the Contracting Office a certificate or written statement of the above required insurance. The policies evidencing required
insurance shall contain an endorsement to the effect that cancellation or any material change in the policies adversely affecting the interests of the Government in such insurance shall not be effective until 10 days after written notice thereof to the Contracting Officer.

The Contractor agrees to insert the substance of this clause, including this paragraph, in all subcontracts

52.0231-4001 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)
EFARS 52-231-5000

(a) Allowable costs for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP 1110-1-8, "Construction Equipment Ownership

and Operating Expense Schedule," Region VII. Working conditions shall be considered to be average for determining equipment rates using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retrospective pricing, the schedule in effect at the time the work was performed shall apply.

(b) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36 substantiated by certified copies of paid invoices. Rates for equipment rented from an organization under common control, lease-purchase or sale-leaseback arrangements will be determined using the schedule except that rental costs leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees are allowable. Costs for major repairs and overhaul are unallowable.

(c) When actual equipment costs are proposed and the total amount of the pricing action is over $25,000, cost or pricing data shall be submitted on Standard Form 1411, "Contract Pricing Proposal Cover Sheet." By submitting cost or pricing data, the contractor grants to the contracting officer or an authorizing representative the right to examine those books, records, documents and other supporting data that will permit evaluation of the proposed equipment costs. After price agreement the contractor shall certify that the equipment costs of pricing data submitted are accurate, complete and current.

(End of clause)

52.232-33 PAYMENT BY ELECTRONIC FUNDS TRANSFER—CENTRAL CONTRACTOR REGISTRATION (MAY 1999)

(a) Method of payment. (1) All payments by the Government under this contract shall be made by electronic funds transfer (EFT), except as provided in paragraph (a)(2) of this clause. As used in this clause, the term “EFT” refers to the funds transfer and may also include the payment information transfer.

(2) In the event the Government is unable to release one or more payments by EFT, the Contractor agrees to either--

(i) Accept payment by check or some other mutually agreeable method of payment; or

(ii) Request the Government to extend the payment due date until such time as the Government can make payment by EFT (but see paragraph (d) of this clause).

(b) Contractor's EFT information. The Government shall make payment to the Contractor using the EFT information contained in the Central Contractor Registration (CCR) database. In the event that the EFT information changes, the Contractor shall be responsible for providing the updated information to the CCR database.

(c) Mechanisms for EFT payment. The Government may make payment by EFT through either the Automated Clearing House (ACH) network, subject to the rules of the National Automated Clearing House Association, or the Fedwire Transfer System. The rules governing Federal payments through the ACH are contained in 31 CFR part 210.

(d) Suspension of payment. If the Contractor's EFT information in the CCR database is incorrect, then the Government need not make payment to the Contractor under this contract until correct EFT information is entered into the CCR database; and any invoice or contract financing request shall be deemed not to be a

proper invoice for the purpose of prompt payment under this contract. The prompt payment terms of the contract regarding notice of an improper invoice and delays in accrual of interest penalties apply.

(e) Contractor EFT arrangements. If the Contractor has identified multiple payment receiving points (i.e., more than one remittance address and/or EFT information set) in the CCR database, and the Contractor has not notified the Government of the payment receiving point applicable to this contract, the Government shall make payment to the first payment receiving point (EFT information set or remittance address as applicable) listed in the CCR database.

(f) Liability for uncompleted or erroneous transfers. (1) If an uncompleted or erroneous transfer occurs because the Government used the Contractor's EFT information incorrectly, the Government remains responsible for--

(i) Making a correct payment;

(ii) Paying any prompt payment penalty due; and

(iii) Recovering any erroneously directed funds.

(2) If an uncompleted or erroneous transfer occurs because the Contractor's EFT information was incorrect, or was revised within 30 days of Government release of the EFT payment transaction instruction to the Federal Reserve System, and--

(i) If the funds are no longer under the control of the payment office, the Government is deemed to have made payment and the Contractor is responsible for recovery of any erroneously directed funds; or

(ii) If the funds remain under the control of the payment office, the Government shall not make payment, and the provisions of paragraph (d) of this clause shall apply.

(g) EFT and prompt payment. A payment shall be deemed to have been made in a timely manner in accordance with the prompt payment terms of this contract if, in the EFT payment transaction instruction released to the Federal Reserve System, the date specified for settlement of the payment is on or before the prompt payment due date, provided the specified payment date is a valid date under the rules of the Federal Reserve System.

(h) EFT and assignment of claims. If the Contractor assigns the proceeds of this contract as provided for in the assignment of claims terms of this contract, the Contractor shall require as a condition of any such assignment, that the assignee shall register in the CCR database and shall be paid by EFT in accordance with the terms of this clause. In all respects, the requirements of this clause shall apply to the assignee as if it were the Contractor. EFT information that shows the ultimate recipient of the transfer to be other than the Contractor, in the absence of a proper assignment of claims acceptable to the Government, is incorrect EFT information within the meaning of paragraph (d) of this clause.

(i) Liability for change of EFT information by financial agent. The Government is not liable for errors resulting from changes to EFT information made by the Contractor's financial agent.

(j) Payment information. The payment or disbursing office shall forward to the Contractor available payment information that is suitable for transmission as of the date of release of the EFT instruction to the Federal Reserve System. The Government may request the Contractor to designate a desired format and method(s) for delivery of payment information from a list of formats and methods the payment office is capable of executing. However, the Government does not guarantee that any particular format or method of delivery is available at any particular payment office and retains the latitude to use the format and delivery method most convenient to the Government. If the Government makes payment by check in accordance with paragraph (a) of this clause, the Government shall mail the payment information to the remittance address contained in the CCR database.

(End of Clause)

52.232-4001 CONTINUING CONTRACTS (ALTERNATE) (MAR 1995) EFARS 52-232-5002

(a) Funds are not available at the inception of this contract to cover the entire contract price. The sum of $310,550.00 has been reserved for this contract and is available for payment to the contractor during the current fiscal year. It is expected that Congress will make appropriations for future fiscal years from which additional funds, together with funds provided by one or more non-federal project sponsors will be reserved for this contract. The liability of the United States for payment beyond the funds reserved for this contract is contingent on the reservation of additional funds.

(b) Failure to make payment in excess of the amount currently reserved, or that may be reserved from time to time, shall not be considered a breach of this contract, and shall not entitle the contractor to a price adjustment under the terms of this contract except as specifically provided in paragraphs (e) and (h) below.

(c) The Government may at any time reserve additional funds for payments under the contract if there are funds available for such purpose. The contracting officer will promptly notify the contractor of any additional funds reserved for the contract by issuing and administrative modification to the contract.

(d) If earnings will be such that funds reserved for the contract will be exhausted before the end of any fiscal year, the contractor shall give written notice to the contracting officer of the estimated date of exhaustion and of additional funds which will be needed to meet payments due or to become due under this contract during that fiscal year. This notice shall be given not less than 45 nor more than 60 days prior to the estimated date of exhaustion.

(e) No payments will be made after exhaustion of funds except to the extent that additional funds are reserved for the contract. If and when sufficient additional funds are reserved, the contractor shall be entitled to simple interest on any payment that the contracting officer determines was actually earned under the terms of this contract and would have been made except for exhaustion of funds. Interest shall be computed from the time such payment would otherwise have been made until actually or constructively made, and shall be at the rate established by the Secretary of the Treasury pursuant to Public Law 92-41, 85 Stat 97, as in effect on the first day of the delay in such payment.

(f) Any suspension, delay, or interruption of work arising from exhaustion or anticipated exhaustion of funds shall not constitute a breach of this contract and shall not entitle the contractor to any price adjustment under a "Suspension of Work" or similar clause or in any other manner under this contract.

(g) An equitable adjustment in performance time shall be made for any increase in the time required for performance of any part of the work arising from exhaustion of funds or the reasonable anticipation of exhaustion of funds.

(h) If, upon the expiration of sixty (60) days after the beginning of the fiscal year following an exhaustion of funds, the Government has failed to reserve sufficient additional funds to cover payments otherwise due, the contractor, by written notice delivered to the contracting officer at any time before such additional funds are reserved, may elect to treat his right to proceed with the work as having been terminated. Such a termination shall be at no cost to the Government, except that, to the extent that additional funds to make payment therefore are allocated to this contract, it may be treated as a termination for the convenience of the Government.

(i) If at any time it becomes apparent that the funds reserved for any fiscal year are in excess of the funds required to meet all payments due or to become due the contractor because of work performed and to be performed under this contract during the fiscal year, the Government reserves the right, after notice to the contractor, to reduce said reservation by the amount of such excess.

(j) The term "Reservation" means monies that have been set aside and made available for payments under this contract.

(End of clause)

52.236-4 PHYSICAL DATA (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) The indications of physical conditions on the drawings and in the specifications are the result of site investigations by surveys.

(b) Weather conditions: The Contractor shall satisfy himself as to the hazards likely to arise from weather conditions.

(c) Transportation facilities: The contractor shall make his own investigation of the conditions of existing public and private roads and clearances, restrictions, bridge load limits and other limitations affecting transportation and ingress and egress at the job site. The unavailability transportation facilities or limitations thereof shall not become a basis for claims against the Government or extensions of time for completion of the work

(d) N/A

52.236-16 QUANTITY SURVEYS, ALTERNATE I (APR 1984)

(a) Quantity surveys shall be conducted, and the data derived from these surveys shall be used in computing the quantities of work performed and the actual construction completed and in place.

(b) The Contractor shall conduct the original and final surveys and surveys for any periods for which progress payments are requested. All these surveys shall be conducted under the direction of a representative of the Contracting Officer, unless the Contracting Officer waives this requirement in a specific instance. The Government shall make such computations as are necessary to determine the quantities of work performed of finally in place. The Contractor shall make the computations based on the surveys for any periods for which progress payments are requested.

(c) Promptly upon completing a survey, the Contractor shall furnish the originals of all field notes and all other records relating to the survey or to the layout of the work to the Contracting Officer, who shall use them as necessary to determine the amount of progress payments. The Contractor shall retain copies of all such material furnished to the Contracting Officer.

52.236-21 SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FEB 1997)

(a) The Contractor shall keep on the work site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto. Anything mentioned in the specifications and not shown on the drawings, or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both. In case of difference between drawings and specifications, the specifications shall govern. In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing. Any adjustment by the Contractor without such a determination shall be at its own risk and expense. The Contracting Officer shall furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

(b) Wherever in the specifications or upon the drawings the words "directed", "required", "ordered", "designated", "prescribed", or words of like import are used, it shall be understood that the "direction", "requirement", "order", "designation", or "prescription", of the Contracting Officer is intended and similarly the words "approved", "acceptable", "satisfactory", or words of like import shall mean "approved by," or "acceptable to", or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

(c) Where "as shown," as indicated", "as detailed", or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place," that is

"furnished and installed".

(d) Shop drawings means drawings, submitted to the Government by the Contractor, subcontractor, or any lower tier subcontractor pursuant to a construction contract, showing in detail (1) the proposed fabrication and assembly of structural elements, and (2) the installation (i.e., fit, and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the contractor to explain in detail specific portions of the work required by the contract. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(e) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate its approval thereon as evidence of such coordination and review. Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission. The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the Government's reasons therefor. Any work done before such approval shall be at the Contractor's risk. Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) below.

(f) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Contracting Officer approves any such variation, the Contracting Officer shall issue an appropriate contract modification, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

(g) The Contractor shall submit to the Contracting Officer for approval four copies (unless otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the Contracting Officer and one set will be returned to the Contractor.

52.0236-4001 PLANT AND MATERIAL REMOVAL AFTER CONTRACT TERMINATION (MAR 1996) EFARS 52.236-5000

Should this contract be terminated as provided in clause 52.232-5001 because of the failure of Congress to provide additional funds for its completion, the contractor may be permitted to remove plant and material on which payments for preparatory work have been made, subject to an equitable deduction from the amounts due the contractor to reimburse the United States for the unabsorbed value of such plant and material.

(End of clause)

520249-4001 BASIS FOR SETTLEMENT OF PROPOSALS EFARS 52.249-5000

Actual costs will be used to determine equipment costs for a settlement proposal submitted on the total cost basis under FAR 49.206-2(b). In evaluating a terminations settlement proposal using the total costs basis, the following principals will be applied to determine allowable equipment costs:

(1) Actual costs for each piece of equipment, or groups of similar serial or series equipment, need not be available in the contractor's accounting records to determine total actual equipment costs.

(2) If equipment costs have been allocated to a contract using predetermined rates, those charges will be adjusted to actual costs.

(3) Recorded job costs adjusted for unallowable and unallowable expenses will be used to determine equipment operating expenses. [3]

(4) Ownership costs (depreciation) will be determined using the contractor's depreciation schedule (subject to the provisions of FAR 31.205-11).

(5) License, taxes, storage and insurance costs age normally recovered as an indirect expense and unless the contractor charges these costs directly to contracts, they will be recover through the indirect expense rate.

(End of Statement)

252.236-7001 CONTRACT DRAWINGS, MAPS, AND SPECIFICATIONS (AUG 2000)

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic or paper media as chosen by the Contracting Officer.

(b) The Contractor shall--

(1) Check all drawings furnished immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer of any discrepancies;

(4) Be responsible for any errors that might have been avoided by complying with this paragraph (b); and

(5) Reproduce and print contract drawings and specifications as needed.

(c) In general--

(1) Large-scale drawings shall govern small-scale drawings; and

(2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work that are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified on the following index of drawings:

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SECTION 00850

RATES OF WAGES

General Decision Number NV010005
Superseded General Decision No. **NV000005**
State: Nevada
Construction Type:
HEAVY
HIGHWAY
County(ies):

CARSON CITY	EUREKA	NYE
CHURCHILL	HUMBOLDT	PERSHING
CLARK	LANDER	STOREY
DOUGLAS	LINCOLN	WASHOE
ELKO	LYON	WHITE PINE
ESMERALDA	MINERAL	

HEAVY AND HIGHWAY CONSTRUCTION PROJECTS (Except construction projects at the NEVADA TEST SITE and TONOPAH TEST RANGE) (and Excluding Water Well Drilling)

Modification Number	Publication Date
0	03/02/2001
1	05/04/2001
2	06/22/2001
3	07/13/2001

COUNTY(ies):

CARSON CITY	EUREKA	NYE
CHURCHILL	HUMBOLDT	PERSHING
CLARK	LANDER	STOREY
DOUGLAS	LINCOLN	WASHOE
ELKO	LYON	WHITE PINE
ESMERALDA	MINERAL	

CARP0034L 07/01/1998

	Rates	Fringes
CARSON CITY, CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE AND WHITE PINE COUNTIES		
DIVER STANDBY	27.65	12.425
DIVER WET	38.90	12.425
DIVER TENDER	27.65	12.425
PILE DRIVERS: (Bridge, Warf & Dock Builders)	25.65	12.425

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* CARP0971E 07/01/2001

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, AND WHITE PINE.		
CARPENTERS	24.95	5.75

CARP1780A 07/01/1999

	Rates	Fringes
CLARK, ESMERALDA, LINCOLN AND NYE COUNTIES		
CARPENTERS:		
30 Mile radius around Las Vegas (Measured from the intersection of Maryland Parkway and Charleston Blvd.)	27.18	7.65
30 to 50 Mile radius around Las Vegas (same as above)	28.68	7.65
Over 50 mile Mile radius around Las Vegas (same as above)	30.43	7.65
Laughlin Area	29.18	7.65

	Rates	Fringes
ELEC0357F 06/01/1999		
CLARK, LINCOLN, AND NYE (South of the Mt. Diablo Base Line) COUNTIES		
ELECTRICIANS	27.90	10.21+3%
ELEC0357G 07/01/1997	Rates	Fringes
CLARK, LINCOLN, AND NYE COUNTIES		
LINE CONSTRUCTION WORKERS:		
Area bound by a 30 mile radius from the intersection of Main Street and Fremont Street in Las Vegas (Free Area)		
Groundman	17.98	5.95+3%
Line Equipment Operators	21.86	5.95+3%
Lineman	24.45	5.95+3%
Area between a 30 mile radius and 60 mile radius from Main and Fremont Streets		
Groundman	18.98	5.95+3%
Line Equipment Operators	22.86	5.95+3%
Lineman	25.45	5.95+3%
Area Over 60 mile radius from Main and Fremont Streets		
Groundman	20.98	5.95+3%
Line Equipment Operators	24.86	5.95+3%
Lineman	27.45	5.95+3%
* ELEC0401F 06/01/2001	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, ESMERALDA, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, AND WHITE PINE COUNTYS.		
ELECTRICIANS:		
ELECTRICAINS	26.21	7.10+3%
CABLE SPLICER	28.78	7.10+3%
ELEC0401G 02/01/1993	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, ESMERALDA, EUREKA, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, AND WHITE PINES COUNTYS.		
LINE CONSTRUCTION:		
Lineman	21.74	5.34+3-3/4%
Cable Splicer	23.91	5.34+3-3/4%
Equipment Operator	19.57	5.34+3-3/4%
Groundman	14.13	5.34+3-3/4%
ENGI0012H 08/01/1999	Rates	Fringes
HYDRAULIC SUCTION AND CLAMSHELL DREDGES		
Leverman	34.20	8.00
Deck Captain	31.30	8.00
Dozer	30.73	8.00
Watch Engineer, Welder and Deckmate	30.62	8.00
Winchman (Stern Winch) (on dredge)	30.07	8.00
Deckhand (can operate		

anchor scow under direction		
of mate), Bargeman	29.53	8.00
Barge mate	30.14	8.00

ENGI0012J 07/01/2000

	Rates	Fringes
CLARK, ESMERALDA LINCOLN AND NYE COUNTIES		
POWER EQUIPMENT OPERATORS:		
Group 1	28.54	8.30
Group 2	29.49	8.30
Group 3	29.78	8.30
Group 4	30.67	8.30
Group 5	31.77	8.30
Group 6	30.89	8.30
Group 7	31.99	8.30
Group 8	31.00	8.30
Group 9	32.10	8.30
Group 10	31.12	8.30
Group 11	32.22	8.30
Group 12	31.29	8.30
Group 13	31.39	8.30
Group 14	31.42	8.30
Group 15	31.50	8.30
Group 16	31.62	8.30
Group 17	31.79	8.30
Group 18	31.89	8.30
Group 19	32.00	8.30
Group 20	32.12	8.30
Group 21	32.29	8.30
Group 22	32.39	8.30
Group 23	32.50	8.30
Group 24	32.62	8.30
CRANES, PILEDRIVING & HOISTING EQUIPMENT		
Group 1	29.29	8.30
Group 2	30.24	8.30
Group 3	30.53	8.30
Group 4	30.67	8.30
Group 5	30.89	8.30
Group 6	31.00	8.30
Group 7	31.12	8.30
Group 8	31.29	8.30
Group 9	31.46	8.30
Group 10	32.46	8.30
Group 11	33.96	8.30
Group 12	34.46	8.30
Group 13	35.46	8.30
TUNNEL GROUP:		
Group 1	30.74	8.30
Group 2	31.03	8.30
Group 3	31.17	8.30
Group 4	31.39	8.30
Group 5	31.50	8.30
Group 6	31.62	8.30
Group 7	31.79	8.30

From the City Hall of Las Vegas
20 Miles to 40 Miles - add $1.50 per hour to wage rates
40 Miles to 60 Miles - add $2.50 per hour to wage rates
Over 60 Miles - add $3.00 per hour to wage rates

POWER EQUIPMENT OPERATOR CLASSIFICATIONS:

GROUP 1: Bargeman, brakeman, compressor operator (when more than

five (5) 900 CFM or larger units, additional operator required), ditch witch, with seat or similar type equipment, elevator operator - inside, engineer oiler, generator operator, generator, pump or compressor plant operator, pump operator, signalman, switchman

GROUP 2: Asphalt - rubber plant operator, concrete mixer operator - skip type, conveyor operator, fireman, hydrostatic pump operator, oiler crusher (asphalt or concrete plant), skiploader (when wheel type up to 3/4 yd. without attachment), soils field technician, tar pot fireman, temporary heating plant operator, trenching machine oiler, nurse tank operator.

GROUP 3: Asphalt - rubber blend operator, equipment greaser (rack), ford ferguson (with dragtype attachments), helicopter radioman (ground), power concrete curing machine operator, power concrete saw operator, power - driven jumbo form setter operator, stationary pipe wrapping and cleaning machine operator

GROUP 4: Asphalt plant fireman, backhoe operator (mini-max or similar type), boring machine operator, boxman or mixerman (asphalt or concrete), chip spreading machine operator, concrete pump operator (small portable), drilling machine operator, small auger types (Texoma super economatic or similar types - Hughes 100 or 200 or similar types - drilling depth of 30' maximum), equipment greaser (grease truck), guard rail post driver operator, highline cableway signalman, hydra-hammer-aero stomper, power sweeper operator, roller operator (compacting), screed operator (asphalt or concrete), trenching machine operator (up to 6ft.), concrete cleaning decontamination machine operator, power concrete curing machine operator,

GROUP 5: Equipment Greaser (Grease Truck)

GROUP 6: Asphalt plant engineer, batch plant operator, bit sharpener, concrete joint machine operator (canal and similar type), concrete planer operator, deck engine operator, derrickman (oilfield type), drilling machine operator, bucket or auger types (Caldwell 100 bucket or similar types - Watson 1000 auger or similar types - Texoma 330, 500 or 600 auger or similar types - drilling depth of 45' maximum), drilling machine operator, hydrographic seeder machine operator (straw, pump or seed), Jackson track maintainer, or similar type, Kalamazoo switch tamper, or similar type, machine tool operator, Maginnis internal full slab vibrator, mechanical berm, curb or gutter (concrete or asphalt), mechanical finisher operator (concrete, Clary-Johnson-Bidwell or similar type), pavement breaker operator (truck mounted), road oil mixing machine operator, roller operator (asphalt or finish), rubber - tired earth moving equipment (single engine, up to and including 25 yds. struck), self-propelled tar pipelining machine operator, skiploader operator (crawler and wheel type, over 3/4 yd. and up to and including 1-1/2 yds.), slip form pump operator (power driven hydraulic lifting device for concrete forms), tractor operator - bulldozer, tamper-scraper (single engine, up to 100 h.p. flywheel and similar types, up to and including D-5 and similar types), tugger hoist operator

GROUP 7: Asphalt or concrete spreading operator (tamping or finishing), asphalt paving machine operator (Barber Greene or similar type - 1 screedman required), Asphalt -rubber distributor operator, backhoe operator (up to and including 3/4 yd.), small Ford, Case or similar, cast-in-place pipe laying machine operator, combination mixer and compressor operator (gunite work), compactor operator (self-propelled), concrete mixer operator (paving), crushing plant operator, drill doctor,

drilling machine operator, bucket or auger types (Caldwell 150 bucket or similar types - Watson 1500, 2000 2500 auger or similar types - Texoma 700, 800 auger or similar types - drilling depth of 60' maximum), elevating grader operator, grade checker, gradall operator, grouting machine operator, heavy-duty repairman, kalamazoo ballast regulator or similar type, Kolman belt loader and similar type, Le Tourneau blob compactor or similar type, loader operator (Athey, Euclid, Sierra and similar types), pneumatic concrete placing machine operator (Hackley-Presswell or similar type), pumpcrete operator, rotary drill operator (excluding caisson type), rubber-tired earth-moving equipment operator (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. up to and including 50 cu. yds. struck), rubber-tired earth-moving equipment operator (multiple engine up to and including 25 yds. struck), rubber-tired scraper operator (self-loading paddle wheel type - John Deere, 1040 and similar single unit), self- propelled curb and gutter machine operator, skipload operator (crawler and wheel type over 1-1/2 yds. up to and including 6-1/2 yds.), surface heaters and planer operator, tractor compressor drill combination operator, tractor operator (any type larger than D-5 - 100 flywheel h.p. and over, or similar - bulldozer, tamper, scraper and push tractor single engine), tractor operator (boom attachments), traveling pipe wrapping, cleaning and bending machine operator, trenching machine operator (over 6 ft. depth capacity, oiler required)

GROUP 8: Heavy duty repairman

GROUP 9: Drilling machine operator, bucket or auger types (Caldwell 200 B bucket or similar types - Watson 3000 or 5000 auger or similar types - Texoma 900 auger or similar types - drilling depth of 105' maximum), dual drum mixer, monorail locomotive operator (diesel, gas or electric), motor patrol - blade operator (single engine), multiple engine tractor operator (Euclid and similar type - except Quad 9 cat.), rubber-tired earth-moving equipment operator (single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator (multiple engine, Euclid, Caterpillar and similar over 25 yds. and up to 50 yds.), tower crane repair person, tractor loader operator (crawler and wheel type over 6-1/2 yds.), Woods mixer operator (and similar pugmill equipment)

GROUP 10: Dynamic compactor LDC350 (or similar types

GROUP 11: Auto grader operator, automatic slip form operator, drilling machine operator, bucket or auger types (Caldwell, auger 20 CA or similar types - Watson auger 6000 or similar types - drilling depth of 175' maximum), hoe ram or similar with compressor, mass excavator operator, mechanical finishing machine operator, mobile form traveler operator, motor patrol operator (multi-engine), pipe mobile machine operator, rubber-tired earth-moving equipment operator (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck), rubber-tired self-loading scraper operator (paddle-wheel-auger type self-loading - two (2) or more units)

GROUP 12: Rubber-tired earth-moving equipment operator operating equipment with push-pull system (single engine, up to and including 25 yds. struck)

GROUP 13: Canal liner operator, canal trimmer operator, remote-control earth-moving equipment operator, wheel excavator operator

GROUP 14: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine,

Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck), rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine - up to and including 25 yds. struck)

GROUP 15: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 16: Rubber-tired earth-moving equipment operator, operating equipment with push-pull system (multiple engine, Euclid, Caterpillar and similar, over 50 cu. yds. struck), tandem tractor operator (operating crawler type tractors in tandem - Quad 9 and similar type)

GROUP 17: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, up to and including 25 yds. struck)

GROUP 18: Rotex concrete belt operator (or similar types), rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, including compaction units - single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 cu. yds. struck), rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, up to and including 25 yds. struck),

GROUP 19: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - single engine, over 50 yds. struck), rubber-tired earth moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, euclid, caterpillar and similar over 25 yds. and up to 50 yds. struck)

GROUP 20: Rubber-tired earth-moving equipment operator, operating in tandem (scrapers, belly dumps and similar types in any combination, excluding compaction units - multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

GROUP 21: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, up to and including 25 yds. struck)

GROUP 22: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, Caterpillar, Euclid, Athey Wagon and similar types with any and all attachments over 25 yds. and up to and including 50 yds. struck), rubber-tired earth-moving equipment operator, operating with the tandem push-pull system (multiple engine, up to and including 25 yds. struck)

GROUP 23: Rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (single engine, over 50 yds. struck), rubber-tired earth-moving equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar, over 25 yds. and up to 50 yds. struck)

GROUP 24: Concrete pump operator - truck mounted (oiler required when boom over 105' or 36 meters), rubber-tired earth-moving

equipment operator, operating equipment with the tandem push-pull system (multiple engine, Euclid, Caterpillar and similar type, over 50 cu. yds. struck)

CRANES, PILEDRIVING AND HOISTING EQUIPMENT CLASSIFICATIONS:

GROUP 1: Engineer oiler; Fork lift operator (under 5 tons capacity)

GROUP 2: Truck crane oiler

GROUP 3: A-frame or winch truck operator; Ross carrier operator (jobsite)

GROUP 4: Bridge-type unloader and turntable operator; Helicopter hoist operator

GROUP 5: Stinger crane (Austin-Western or similar type); Tugger hoist operator (1 drum)

GROUP 6: Bridge crane operator; Cretor crane operator; Fork lift operator (over 5 tons); Hoist operator (Chicago boom and similar type); Lift mobile operator; Lift slab machine operator (Vagtborg and similar types); Material hoist operator; Shovel, backhoe, dragline, clamshell operator (over 3/4 yd. and up to 5 cu. yds. mrc); Tugger hoist operator

GROUP 7: Pedestal crane operator; Shovel, backhoe, dragline, clamshell operator (over 5 cu. yds. mrc); Tower crane repair; Tugger hoist operator (3 drum)

GROUP 8: Crane operator (up to and including 25 ton capacity); Crawler transporter operator; Derrick barge operator (up to and including 25 ton capacity); Hoist operator, stiff legs, Guyderrick or similar type (up to and including 25 ton capacity); Shovel, backhoe, dragline, clamshell operator (over 7 cu. yds. mrc)

GROUP 9: Crane operator (over 25 tons and up to and including 50 tons mrc); Derrick barge operator (over 25 tons up to and including 50 tons mrc); Highline cableway operator; Hoist operator, stiff legs, Guy derrick or similar type (over 25 tons up to and including 50 tons mrc); K-crane operator; Polar crane operator; Tower crane operator

GROUP 10: Crane operator (over 50 tons and up to and including 100 tons mrc); Derrick barge operator (over 50 tons up to and including 100 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 50 tons up to and including 100 tons mrc)

GROUP 11: Crane operator (over 100 tons and up to and including 200 tons mrc); Derrick barge operator (over 100 tons up to and including 200 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 100 tons up to and including 200 tons mrc); Mobile tower crane operator (over 100 tons up to and including 200 tons mrc)

GROUP 12: Crane operator (over 200 tons up to and including 300 tons mrc); Derrick barge operator (over 200 tons up to and including 300 tons mrc); Hoist operator, stiff legs, Guy derrick or similar type (over 200 tons, up to and including 300 tons mrc); Mobile tower crane operator (over 200 tons, up to and including 300 tons mrc)

GROUP 13: Crane operator (over 300 tons); Derrick barge operator (over 300 tons); Helicopter pilot; Hoist operator, stiff legs, Guy derrick or similar type (over 300 tons); Mobile tower crane operator (over 300 tons)

TUNNEL CLASSIFICATIONS

GROUP 1: Skiploader (wheel type up to 3/4 yd. without attachment)

GROUP 2: Power-driven jumbo form setter operator

GROUP 3: Dinkey locomotive or motorman (up to and including

10 tons)
GROUP 4: Bit sharpener; Equipment greaser (grease truck); Slip form pump operator (power-driven hydraulic lifting device for concrete forms); Tugger hoist operator (1 drum); Tunnel locomotive operator (over 10 and up to and including 30 tons); Welder - general
GROUP 5: Backhoe operator (up to and including 3/4 yd.); Small Ford, Case or similar; Drill doctor; Grouting machine operator; Heading shield operator; Heavy-duty repairperson; Loader operator (Athey, Euclid, Sierra and similar types); Mucking machine operator (1/4 yd., rubber-tired, rail or track type); Pneumatic concrete placing machine operator (Hackley-Presswell or similar type); Pneumatic heading shield (tunnel); Pumpcrete gun operator; Tractor compressor drill combination operator; Tugger hoist operator (2 drum); Tunnel locomotive operator (over 30 tons)
GROUP 6: Heavy duty repairman - welder combination
GROUP 7: Tunnel mole boring machine operator

ENGI9993D 07/01/2000

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE AND CARSON CITY		
POWER EQUIPMENT OPERATORS		
(Except Piledriving and Steel Erection)		
AREA 1:		
Group 1a	25.33	8.21
Group 2	25.86	8.21
Group 3	26.13	8.21
Group 4	26.87	8.21
Group 5	27.17	8.21
Group 6	27.34	8.21
Group 7	27.59	8.21
Group 8	28.18	8.21
Group 9	28.50	8.21
Group 10	28.85	8.21
Group 10a	29.04	8.21
Group 11	29.28	8.21
Group 11a	30.92	8.21
Group 11b	31.73	8.21
PILEDRIVING		
AREA 1:		
Group 1	37.32	8.21
Group 1a	31.38	8.21
Group 1b	29.46	8.21
Group 2	35.80	8.21
Group 2a	31.17	8.21
Group 2b	29.26	8.21
Group 3	34.35	8.21
Group 3a	30.95	8.21
GROUP 3b	29.03	8.21
Group 4	32.84	8.21
Group 5	31.73	8.21
Group 6	30.62	8.21
Group 7	29.66	8.21
Group 8	27.80	8.21
STEEL ERECTION		
AREA 1:		
Group 1	37.87	8.21

Group 1a	31.70	8.21
Group 1b	29.74	8.21
Group 2	36.36	8.21
Group 2a	31.45	8.21
Group 2b	29.53	8.21
Group 3	35.12	8.21
Group 3a	31.23	8.21
Group 3b	29.31	8.21
Group 3c	34.76	8.21
Group 4	33.39	8.21
Group 5	32.29	8.21

POWER EQUIPMENT OPERATOR CLASSIFICATIONS
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE, CARSON CITY
(EXCLUDING PILEDRIVING AND STEEL ERECTION)
GROUP 1a: Oiler; Partsman (heavy duty repair shop partsroom when needed).
GROUP 2: Compressor; Material Loader and/or Conveyor (handling building materials); Pump Operator
GROUP 3: Bobcat or similar loader (1/4 cu. yd. or less); Concrete Curing Machines (streets, highways, airports, canals); Conveyor belt operator(tunnel); Forklift (under 20 ft.); Engineer Generating plant (500 K.W.); Mixer box operator (concrete plant); Motorman; Rotomist Operator; Screedman (except asphaltic or concrete paving); Oiler (truck crane)
GROUP 4: Concrete mixer, skip type; Dinky; Forklift (20' and over) or Lumber stacker; Ross Carrier; Skip Loader (under 1 cu. yd); Tie Spacer.
GROUP 5: Concrete mixer (over 1 cu. yd); concrete pumps or pumpcrete guns; Elevator and material Hoist (1 drum); Groundman for Asphalt Milling and similar.
GROUP 6: Auger type drilling equipment up to and including 30 ft. depth digging capacity m.r.c.; Boom Truck or Dual Purpose "A" Frame Truck; B.L.H. Lima road pactor or similar; Chip box spreader (flaherty type or similar); Concrete batch plant (wet or dry); Concrete saws (highways, streets, airports, canals); Locomotive (over 30 tons); Lubrication and service engineer (mobile & grease rack); Maginnis international full slab vibrator (airports, highways, canals, warehouses); Mechanical finishers (concrete)(clary, Johnson, Bidwell Bridge Deck or similar types); Mechanical Burn, Curb and/or Curb and Gutter Machine (concrete or asphalt); Pavement breaker, truck mounted, with compressor combination; Pavement breaker or tamper (with or without compressor (combination); Power Jumbo (setting slip-forms, etc. in tunnels); Roller (except asphalt); Self-propelled tape machine; Self-propelled compactor (single engine); Self-propelled power sweeper; slip form pump (power-driven by hydraulic, electric, air, gas, etc. lifting device for concrete forms); Small Rubber-tired Tractors; Snooper Crane, Paxton-Mitchell or similar; Stationary Pipe Wrapping, Cleaning and Bending Machine Operator
GROUP 7: Auger type drilling equipment over 30 ft. depth digging capacity m.r.c.; Compressor (over 2); Concrete conveyor or concrete pump, truck equipment mounted (boom length to apply); Concrete conveyor, building site; Drilling and boring Machinery, vertical and horizontal (not to apply to waterliners, wagon drills or jackhammers); Crusher Plant Engineer; Generators; Kolman Loader; Material Hoist (2 or more drums); Mechanical finishers or spreader machine (asphalt, Barber-Greene and similar); (Screedman required); Mine or shaft hoist; Pipe bending

machines (pipelines only); Pipe cleaning machines (tractor propelled and supported); Pipe wrapping machines (tractor propelled and supported); Portable crushing and screening plants; Post driller and/or driver; Pumps (over 2); Roller operator (asphalt); Screedman (except asphaltic or concrete paving; Screedman (Barber-Green and similar)(Aspaltic or concrete paving); Self-propelled boom-type lifting device (center amount) (on 10 ton capacity or less); Slusher; Soil tester (certified); Soils and material tester; Surface heater and planer; Trenching machine (maxiumum digging capacity 3 feet depth); Truck type loader; Welding machines (gasoline or diesel.

GROUP 8: Asphalt plant Engineer; Asphalt milling machine; Cast-in-place pipe laying machine; Combination slusher and motor op.; Concrete batch plant (multiple units); Dozer Operator; Drill doctor; Elevating grader; Gradesetter, Grade checker; Grooving and grinding machine (highway); Heavy duty repairman and/or welder; Ken-seal; Loader (up to and including 2 1/2 cu. yds.); Mechanical trench shield; Mixermobile; Push cats; Road oil mixing machine (wood-mixer and other similar pugmill equipment); Rubber-tired earth-moving equipment (up to and including 35 cu. yds."struck" M.R.C. Euclid, T-pulls, DW's 10, 20, 21, and similar); Self-propelled compactor with dozer; Hyster 450 or cat 825 or similar; Sheepfoot; Small tractor (with boom); Soil stabilizer (P & H or equal); Timber skidder (rubber-tired and/or similar equipment); Tractor-drawn scraper; Tractor; Tractor-mounted compressor drill combination; Trenching machine (over 3 feet depth); Tri-batch paver; Tunnel badger or tunnel boring machine; Tunnel mole boring machine; Vermeer T-600b rock cutter.

GROUP 9: Chicago boom; Combination backhoe and loader (up to and including 3/8 yard); Combination mixer and compressor (gunite); Lull hi-lift (20 feet or over); Mucking machine; Sub-grader (gurries or other types); Tractor (with boom) (D6 or larger); Track-laying-type earthmoving machine (single engine with tandem scrapers).

GROUP 10: Boom-type backfillng machine; Bridge crane; Carylift or similar; Chemical grouting machine; Derricks (two (2) Group 10 operators required when swing engine remote from hoist); Derrick barges (except excavation work); Euclid loader and similar types; Heavy-Duty rotary drill rigs; Lift-slab (vagtborg and similar types); Loader (over 2 1/2 cu yds. up to and including 4 cu. yds); Locomotive (over 100 tons) (single or multiple units); Multiple-Engine earth-moving machines (euclid, dozers, etc.); Pre-stress wire-wrapping machine; Rubber-tried scraper, self-loading; Single-engine scraper (over 35 cu. yds); Shuttle car (reclaim station); Train loading station; Trenching machine multi-engine with sloping attachment (jefco or similar); Vacuum cooling plant; Whirley crane (up to and including 25 tons).

GROUP 10a: Backhoe (up to and including 1 cu. yd hydraulic); Backhoe (up to and including 1 cu. yd. cable); CMI dual lane auto -grader SP30 or similar; Cranes (not over twenty five (25) tons (hammerhead and gantry); Finish Blade; Gradalls (up to and in-cluding 1 cu. yd); Motor patrol; Power shovels, Clamshells, Draglines, Cranes (up to and including 1 cu. yd.); Rubber-tried scraper, self-loading (twin-engine); Self-propelled boom-type lifting device (center mount) (over 10 tons up to and including 25 tons).

GROUP 11: Automatic asphalt or concrete slip-form paver; Automatic railroad car dumper; Canal trimmer; Cary lift, campbell or similar; Cranes (over 25 tons); Euclid loader when controled

from the pullcat; Highline cableway operator; Loader (over 4 cu yds. up to and including 12 cu. yds.); Multi-Engine earthmoving equipment (up to and including 75 cu. yds. "struck M.R.C); Multi ple Engine Scrapers (when used to push pull); Power shovels, Clam-shells, Draglines, Backhoes, Gradealls (over 1 cu. yd. and up to and including 7 cu. yds. M.R.C.); Self-propelled Boom type lifting device (over 25 tons M.R.C.); Self-propelled Compactor (with multiplepropulsion power units); Single-engine rubber-tried earthmoving machine (with tandem scraper); Slip-form paver (concrete or asphalt)(one (1) Operator and two (2) screedman); Tandem cats and scrapers; Tower crane mobile (including rail-mounted); Truck-mounted hydraulic crane when remote-control equipped (over 10 tons up to and including 25 tons); Universal Liebher and tower cranes (and similar types)(in the erection, dismantling and moving of equipment there shall be an additional operating engineer at group 8 rates); Wheel excavator (up to and including 750 cu. yds. per hour); Whirley cranes (over 25 tons).
GROUP 11a: Band wagons (in conjuction with wheel excavators); Operator of helicopter (when used in construction work); Loaders (over 12 cu. yds.); Multi-engine earthmoving equimpent (over 75 cu. yds. "struck" M.R.C.); Power shovels, Clamshells, Draglines, Backhoes and Gradalls (over 7 cu. yds. M.R.C.); Remote-controlled Earthmoving equipment; Wheel excavator (over 750 cu. yds. per hour)(two (2) Group 11A operators required).
GROUP 11b: Holland loader or similar or loader (over 18 cu. yds)

PILEDRIVING CLASSIFICATIONS

GROUP 1: Derrick barge pedestal mounted over 100 tons; Clam-shells over 7 cu. yds.; Self propelled boom type lifting device over 100 tons; Truck crane or crawler, land or barge mounted over 100 tons;
GROUP 1a: Truck crane oiler.
GROUP 1b: Oiler
GROUP 2: Derrick barge pedestal mounted 45 tons up to and including 100 tons; Clamshells up to and including 7 cu. yds; Self propelled boom type lifting device over 45 tons; Truck crane or crawler, land or barge mounted over 45 tons up to and including 100 tons.
GROUP 2a: Truck crane oiler.
GROUP 2b: Oiler
GROUP 3: Derrick barge pedestal mounted under 45 tons; self propelled boom type lifting device 45 tons and under; Skid/Scow Piledriver, any tonnage; (any assistance required shall be by an employee covered by this agreement); Truck crane or crawler, land or barge mounted 45 tons and under.
GROUP 3a: Truck Crane oiler
GROUP 3b: Oiler
GROUP 4: Forklift, 10 tons and over
GROUP 5: No current classification.
GROUP 6: Deck engineer
GROUP 7: No current classification
GROUP 8: Deckhand, Fireman

STEEL ERECTORS AND FABRICATORS

GROUP 1: Cranes, over 100 tons; Derrick over 100 tons, Self-propelled boom type lifting devices over 100 tons.
GROUP 1a: Truck crane oiler.
GROUP 1b: Oiler
GROUP 2: Cranes, over 45 tons up to and including 100 tons; Derrick 100 tons and under, Self-propelled boom type lifting device, over 45 tons; Tower Crane.
GROUP 2a: Truck crane oiler.

GROUP 2b: Oiler
GROUP 3: Cranes, 45 tons and under; Self propelled boom type lifting device, 45 tons and under
GROUP 3a: Truck crane oiler
GROUP 3b: Hydraulic
GROUP 3c: Oiler
GROUP 4: Chicago boom; Forklift, 10 tons and over; Heavy Duty Repairman/Welder.
GROUP 5: Boom cat

AREA DEFININITIONS AND PAY RATES

AREA 1:
ALL AREA FALLING WITHIN 50 ROAD MILES OF EITHER THE CARSON CITY COURTHOUSE OR THE WASHOE COUNTY COURHOUSE SHALL BE CONSIDERED FREE AREA.
AREA 2:
ALL WORK FALLING BETWEEN 50 AND 150 ROAD MILES OF THE WASHOE COUNTY COURTHOUSE SHALL BE COMPUTED AT AN ADDITIONAL $1.50 PER HOUR ABOVE THE BASE RATE.
AREA 3:
ALL WORK FALLING BETWEEN 150 AND 300 ROAD MILES OF THE WASHOE COUNTY COURTHOUSE SHALL BE COMPUTED AT AN ADDITIONAL $2.00 PER HOUR ABOVE THE BASE RATE.
AREA 4:
ANY WORK PERFORMED IN EXCESS OF 300 ROAD MILES OF THE WASHOE COURTHOUSE SHALL BE COMPUTED AT AN ADDITIONAL $3.00 PER HOUR ABOVE THE BASE RATE.

ENGI9993K 07/01/1997

CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE AND CARSON CITY

HYDRAULIC SUCTION & CLAMSHELL & DIPPER DREDGE

	Rates	Fringes
GROUP 1:		
Area 1	31.04	11.89
Area 2	33.04	11.89
GROUP 2:		
Area 1	26.08	11.89
Area 2	28.08	11.89
GROUP 3:		
Area 1	24.96	11.89
Area 2	26.96	11.89

DREDGING CLASSIFICATIONS

GROUP 1:
Day Mate (Captain); Leverman/Operator
GROUP 2:
Booster Pump Operator, Deck Engineer, Deck Mate, Dredge Dozer; Dredge Tender; Heavy Duty Repairman; Watch Engineer; Winchman
GROUP 3:
Bargeman; Deckhand; Fireman; Leveehand; Oiler

AREA DEFININITIONS

AREA 1:
ALL AREA FALLING WITHIN 50 ROAD MILES OF EITHER THE CARSON CITY COURTHOUSE OR THE WASHOE COUNTY COURHOUSE SHALL BE CONSIDERED FREE AREA.
AREA 2:
ALL WORK FALLING BETWEEN 50 AND 150 ROAD MILES OF THE WASHOE COUNTY COURTHOUSE.
AREA 3:
ALL WORK FALLING BETWEEN 150 AND 300 ROAD MILES OF THE WASHOE

COUNTY COURTHOUSE.
AREA 4:
ANY WORK PERFORMED IN EXCESS OF 300 ROAD MILES OF THE WASHOE COURTHOUSE.

IRON0027J 07/01/2000

	Rates	Fringes
ELKO, EUREKA, AND WHITE PINE COUNTIES		
IRON WORKERS:		
Fence Erectors: Machinery Movers		
Ornamental: Reinforcing. Rigger		
Structural	21.52	7.86

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* IRON0155B 07/01/2001

	Rates	Fringes
CHURCHILL, CLARK, DOUGLAS, ESMERALDA, HUMBOLDT, LANDER, LINCOLN, LYON, MINERAL, NYE, PERSHING, STOREY, WASHOE, AND WHITE PINE COUNTIES		
IRONWORKERS:		
STRUCTURAL, ORNAMENTAL		
AND REINFORCING	26.08	14.575
FENCE ERECTORS (Excluding		
Clark County)	25.19	14.575

LABO0169F 10/01/2000

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE, CARSON CITY		
Group 1	18.85	4.82
Group 1-A	15.98	4.82
Group 2	18.95	4.82
Group 3	19.10	4.82
Group 4	19.35	4.82
Group 5	19.65	4.82
Group 6	19.65	4.82
Group 7	19.35	4.82
Group 8	19.00	4.82
Group 9	13.69	4.82

From the Washoe County Courthouse
50 Miles to 150 Miles - add $1.50 per hour to wage rates
150 Miles to 300 Miles - $2.00 per hour to wage rates
Over 300 Miles - add $3.00 per hour to wage rates

CLASSIFICATIONS

GROUP 1: All cleanup work of debris, grounds and building including windows and tile; dump or spotter (other than asphalt); general laborers; limber, brushloader and piler
GROUP 1-A: Flagmen
GROUP 2: Choker setter or rigger (clearing work only); Pittsburgh chipper and similar type brush shredders; concrete worker (wet or dry) all concrete work not listed in Group 3; crusher or grizzle tender; Guinea chaser (stake); panel forms (wood or metal) handling, cleaning and stripping of; loading and unloading of all rods and materials for reinforcing concrete; railroad track (builders); sloper; semi-skilled wrecker (salvaging of building materials other than those listed in Group 3).
GROUP 3: Asphalt workers (ironers, shoveler, cutting machine); buggymobile; chainsaw, faller, logloader and bucker; compactor (all types); concrete mixer, under 1/2 yd.; concrete pan work (breadpan type) (handling, cleaning, stripping); concrete saw,

chipping, grinding, sanding, vibrator; cribbing, shoring, lagging, trench jacking, hand-guided lagging hammer; curbing or divider machine; curb setter (precast or cut); Ditching machine (hand-guided); driller's tender, chuck tender; form raiser, slip forms; grouting of concrete walls, windows and door jams; headerboard; jackhammer, pavement breaker, air spade; mastic worker (wet or dry); pipe wrapper, kettle, pot, and workers applying asphalt, Creosote and similar type materials; all power tools (air, gas or electric); post driver; riprap stonepaver and rock slinger, including placing of sack concrete, wet or dry; roto tiller; rigging and signaling in connection with laborers work, sandblaster, pot men; vibrascreed; skilled wrecker (removing and salvaging of sash windows, doors, plumbing and electrical; fixtures)
GROUP 4: Burning and welding in connection with laborers' work; joy drill model TWM-2A, gardener denver model DN 143 and similar type drills; track drillers, diamond core drillers, wagon drillers, mechanical drillers on multiple units; high scalers; concrete pump; heavy duty vibrator with stinger 5" diameter or over; pipelayer, caulker and bander; pipelayer - waterline, sewerline, gasline, conduit; asphalt rakers
GROUP 5: Blaster and powder, all work of loading, placing and blasting of all powder and explosive of any type, regardless of method used used for such loading and placing; asbestos removal; lead abatement, hazardous waste and material removal.
GROUP 6: Nozzlemen, Rodman
GROUP 7: Gunmen, Materialmen
GROUP 8: Reboundmen
GROUP 9: Landscaper

LABO0872D 07/01/2000

	Rates	Fringes
CLARK, ESMERALDA, AND LINCOLN COUNTIES; NYE COUNTY (South half, including Highway #6)		
LABORERS:		
Group 1	21.58	7.46
Group 2	21.74	7.46
Group 3	21.84	7.46
Group 4	21.93	7.46
Group 5	22.02	7.46
Group 6	21.84	7.46
Group 7	18.53	7.46

0
1 30 - 50 Miles From City Hall, Las Vegas $1.50 above the base
2 rate.
3
4 50 - 70 Miles From City Hall, Las Vegas $2.50 above the base
5 rate.
6
7 Over 70 Miles From City Hall, Las Vegas $3.00 above the base
8 rate.
9
0 Laughlin Area $2.25 above the base rate.
1
2 LABORER CLASSIFICATIONS
3
4 Group 1: Dry Packing of concrete and filling of form-bolt holes;
5 fine grader, highway and street paving, airport runaways and
6 similar type heavy construction; gas and oil pipeline laborer;
7 guinea chaser; laborer, general; construction or demolition

laborer; packing rod steel and pans; laborers; temporary water lines (portable type); landscape gardener and nursery worker (must have knowledge of plant materials and how to plant them lay out plant arrangements to-follow the landscape plan); tarman and mortarman; kettleman; potman and worker applying asphalt lay-kold creosote, lime and similar type materials ("applying"

means applying, dipping, brushing or handling of such materials for pipe wrapping and waterproofing); underground laborer, including caisson bellowers; window cleaner; scafford erector - (excludes tenders); fence erector - chain link; mortarless, barrier wall and/or retaining walls; mechanical stabilized earth wall; landscape decorative rock installer - ponds, water fall etc.; material handler - (incidental to trade).

Group 2: Asphalt raker, ironer, spreader, Luteman, buggymobile man; cement dumper (on 1 yard or larger mixers and handling bulk cement); cesspool digger and installer; chucktender (except tunnels); concrete core cutter; concrete curer, impervious membrane and oiler of all materials; concrete saw, excluding tractor type, cutting, scoring old or new concrete; gas and oil pipeline wrapper, pot tender and form; making and caulking of all non metallic pipe joints; operators and tenders of pneumatic and electric tools, vibrating machines, hand-propelled trenching machines, impact wrench, multiplate and similar mechanical tools not separately classified herein; operator of cement grinding machine; riprap stonepaver; roto-scraper; sandblaster (pot tender); scaler; septic tank digger and installer; tank scaler and cleaner; tree climber, faller, chain saw operator, pittsburgh chipper and similar type brush shredders

Group 3: Cutting torch operator; gas and oil pipeline wrapper; gas and oil pipeline laborer, certified; jackhammer and/or pavement breaker, laying of all non-metallic pipe, including landscape sprinklers, sewerpipe, drain pipe, and underground tile; mudcutter; concrete vibrator, all sizes; rock slinger; scaler (using Bos'n chair or safety belt or power tools); forklift (incidental to trade) a journeyman shall hold OSHA certification at time of referral.

Group 4: Cribber or shorer, lagging, sheeting, trenching bracing hand guided lagging hammer; head rock slinger; powder - blaster, all work of loading holes, placing and blasting of all powder and explosives of whatever type, regardless of method used for such loading and placing; sandblaster (nozzle operator); steel headerboard

Group 5: Driller (core, diamond or wagon); joy driller model TW-M-2a, Gardener-Denver Model DH 143 and similar type drills (in accordance with memorandum of understanding between laborers and operating engineers dated Miami, Florida, February 3, 1954); Gas and oil pipeline fusion; gas and oil pipeline wrappers, 6" pipe and over-

Group 6: Environmental specialist (asbestos abatement, lead abatement, Hazardous waste abatement, petro-chemical abate ment, radiation remediation.

Group 7: Flag and Signal Person

LABO0872I 07/01/1999

	Rates	Fringes
CLARK, ESMERALDA, AND LINCOLN COUNTIES; NYE COUNTY (South half, including Highway #6)		
LABORERS:		
MINER AND BULLGANG		
Group 1	23.07	7.48
Group 2	22.57	7.48
Group 3	22.32	7.48
Group 4	22.93	7.48
Group 5	22.57	7.48

30 - 50 Miles From City Hall, Las Vegas $1.50 above the base rate.

50 - 70 Miles From City Hall, Las Vegas $2.50 above the base rate.

Over 70 Miles From City Hall, Las Vegas $3.00 above the base rate.

Laughlin Area $2.25 above the base rate.

CLASSIFICATIONS

Group 1: Shaft, Raise, Stope Miner

Group 2: Miner - Tunnel (Hardrock)

Group 3: BullGang, Mucker, Trackman

Group 4: Miner - Welder

Group 5: Pipe Jacking, Micro-Tunneling, Tunnel Boring Machine

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PAIN0159F 07/01/1999

	Rates	Fringes
CLARK, ESMERALDA, LINCOLN AND NYE COUNTIES		
PAINTERS:		
Brush, Roller, Paperhangers, Spray, Sandblasters, Pot Tender, Nozzleman, Tapers, Marbleizing, Metal Leafing Sign Painters, Acid Staining, Graining and Buffing	24.27	5.05
Structural Steel Paint and Sandblasting, Buffing Steel	24.62	5.05
Special Coating	25.27	5.05
Steeplejack	26.02	5.05

PAIN0567E 10/01/1999

	Rates	Fringes
CARSON CITY, CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT,		

LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE AND WHITE PINE COUNTIES

PAINTERS:		
Brush and Roller	20.03	4.36
Spray; Paperhangers; and Sandblaster; Special Coatings Application - Brush	20.78	4.36
Structural Steel (not to include stairways, tube steel, Q-decks & trust joints worked off powered lift in enclosed building); Steeplejack Brush/ Spray over 40 feet with open space below; Special Coatings Application - Spray	21.03	4.36
Special Coatings Application - Spray Steel	21.28	4.36
Drywall Taper	21.28	4.36
Steeplejack - Taper, over 40 ft. with open space	22.18	4.36

PLAS0241G 10/01/1997

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, ESMERALDA, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, AND WHITE PINE COUNTIES		
CEMENT MASONS		
Cement Masons	17.02	7.10
Mastic. magesite and all composition masons	17.27	7.10

PLAS0797G 07/01/1999

	Rates	Fringes
CLARK, ESMERALDA, LINCOLN AND NYE COUNTIES		
CEMENT MASONS:		
0 to 30 Miles from City Hall in Las Vegas	24.23	6.55
30 to 50 Miles from City Hall in Las Vegas	25.73	6.55
50 to 70 Miles from City Hall in Las Vegas	26.73	6.55
Over 70 Miles from City Hall in Las Vegas	27.73	6.55

PLUM0350G 02/01/2001

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, WHITE PINE, CARSON CITY COUNTIES, and NYE COUNTY (North of Hwy. #6 including the City of		

Tonopah)

PLUMBERS & PIPEFITTERS	23.45	5.75

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* PLUM0525G 06/01/2001

	Rates	Fringes
CLARK, ESMERALDA AND LINCOLN, COUNTIES; NYE COUNTY (South of Hwy. #6 including the City of Tonopah)		
PLUMBERS & PIPEFITTERS	30.01	10.61

ROOF0162D 03/01/1999

	Rates	Fringes
ROOFERS	17.78	3.17

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* SHEE0026C 07/01/2001

	Rates	Fringes
CHURCHILL, DOUGLAS, ELKO, EUREKA, HUMBOLDT, LANDER, LYON, MINERAL, PERSHING, STOREY, WASHOE, CARSON CITY AND NYE COUNTY (North of the First Standard Parallel Line north of the 38th Parallel)		
SHEET METAL WORKERS	25.83	8.77

SHEE0088H 07/01/2000

	Rates	Fringes
CLARK, ESMERALDA, AND LINCOLN COUNTIES; NYE COUNTY (South of the First Standard Parallel Line north of the 38th Parallel); WHITE PINE COUNTY		
SHEET METAL WORKERS	31.27	7.80

TEAM0533A 01/01/1998

	Rates	Fringes
REMAINING COUNTIES AND NYE COUNTY (North of and including highwAY #6)		
TRUCK DRIVERS		
All dump trucks (Single or multiple dump units including Semi's and Double and Transfer units:		
Under 4 yards (water level) 4 yards and under 8 yards (water level)	16.62	7.40
3 yards & under 18 yards (water level)	16.84	7.40
3 yards & under 25 yards (water level)	17.05	7.40

25 yards & under 60 yards (water level)	17.64	7.40
60 yards & under 75 yards (water level)	19.08	7.40
75 yards & under 100 yards (water level)	19.82	7.40
100 yards & over (water level)	20.50	7.40
150 yards & under 250 yards	22.50	7.40
250 yards & under 350 yards	25.50	7.40
Over 350 yards	27.00	7.40

(Men regularly employed underground on tunnel work shall be paid forty-five ($.45) cents per hour for such work, provided that such employment underground on tunnel work continues for one (1) or more hours)

Bulk cement spreader (with or with or without Auger) Use dump truck scales.

Bootman (a bootman when employed on such equipment shall receive the rate specified for the classification of road oil trucks or bootman).

Transit Mix, Manufactures Rating:

Under 8 yards	17.05	7.40
8 yards & including 12 yards	17.16	7.40
Over 12 yards	17.38	7.40

Transit Mix with boom shall receive $.12-1/2 cents per hour above the appropriate yardage classification rate of pay when such boom is used.

Water Trucks:

Up to 2,500 gallons	16.84	7.40
2,500 gallons & over	17.05	7.40

Jetting truck (use appropriate water truck rate.

DW20's and 21's and other

similar cat type, Terra cobra, Le Tourneau pulls, Tournerocker, Euclid and similar type equipment when pulling Aqua/pak, Water tank trailers and fuel and/or Grease Tank trailer or other miscellaneous trailers (except as definded under dump trucks.	17.33	7.40
Heavy Duty Transport (High bed)	17.22	7.40
Heavy Duty Transport (Gooseneck Low Bed)	17.22	7.40
Tiltbed or Flatbed Pull Trailers	17.22	7.40
Bootman, combination bootman and road oiler	17.11	7.40
Flat Rack (2 or 3 axle unit)	14.94	7.40
Bus and Manhaul drivers:		
Up to 18,000 lbs. (single unit)	16.67	7.40
18,000 lbs & over (single unit)	16.78	7.40
Helicopter Pilot (when transporting men or materials)	30.66	7.40
Industrial Lift truck (use appropriate flat rack rate (mechanical tailgate)		
Lift Jitneys & Fork Lift	16.89	7.40
Winch Truck & "A" Frame Drivers:		
Under 18,000 lbs.	16.78	7.40
18,000 lbs. & over	16.89	7.40
Warehouse Spotters	16.23	7.40
Teamsters Warehouse Clerk	16.84	7.40
Tire Repairman	16.55	7.40
Truck Repairman	17.05	7.40
Pick-up Truck & Pilot Cars (Job Site)	14.74	7.40
Pick-up Truck & Pilot Car (over the road)	16.73	7.40
Truck Oil and Greaser	16.78	7.40
Fuel Truck Driver	16.78	7.40
Fuel Man & Fuel Island Man	16.78	7.40

When on grease and fuel truck, an Engineer Oil and Teamster Oil, work interchangeable servicing trucks and other equipment, The wage rate shall be identical.

AREA 1: All that area falling within fifty (50) road miles of either the Carson City or Washoe County Courthouse shall be considerer a free area.

AREA 2: All work falling between fifty (50) and (150) road miles of the Washoe County Courthouse shall be computed at and additional $1.50 per hour.

AREA 3: All work falling between one hundred and fifty (150) and three hundred (300) road miles of the Washoe County Courthouse shall be computed at additional $2.00 per hour.

AREA 4: Any work performed in excess of three hundred (300) road miles of the Washoe County Courthouse shall be computed at $3.00 per hour.

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	Rates	Fringes
CLARK, ESMERALDA, LINCOLN COUNTIES AND NYE COUNTY (South of and excluding Highway #6)		
TRUCK DRIVERS:		
GROUP 1:	21.35	7.12
GROUP 2:	21.46	7.12
GROUP 3:	21.67	7.12
GROUP 4:	21.85	7.12
GROUP 5:	22.00	7.12
GROUP 6:	22.35	7.12

30 - 50 Miles from City Hall, Las Vegas $1.00 above the base rate.
50 - 70 Miles from City Hall, Las Vegas $2.00 above the base rate.
70 - 80 Miles from City Hall, Las Vegas $3.00 above the base rate.
Over 80 Miles from City Hall, Las Vegas $3.50 above the base rate.
Laughlin and Mesquite Areas, $3.00 above the base rate.

Group 1: Dump trucks (less than 12 yards water level); trucks (legal payload capacity less than 15 tons); water and fuel trucks (under 2500 gallons); pickups; service; drivers of busses (on jobsite used for transportation of up to 25 passengers); teamster equipment (highest rate for dual craft operation); working flat rack driver.

Group 2: Dump trucks (12 yards but less than 16 yards water level); trucks (legal payload capacity between 15 and 20 tons); transit mix trucks (under 3 yds.; dumpcrete trucks (less than 6-1/2 yds. water level); gas and oil pipeline working truck drivers; including winch truck and all sizes of trucks; water and fuel truck drivers (2,500 gallon to 4,000 gallon); truck greaser; drivers of busses (on jobsite used for transportation of more than twenty-five (25) passengers); warehouse clerk.

Group 3: Dump trucks (16 yds. up to and including 22 yds. water level); driver of trucks (legal payload cap. 20 tons but less than 30 tons); dumpster trucks; drivers of transit-mix trucks (3 yds. but less than 6 yds.); dumpcrete trucks (6-1/2 yds. water level and over); fork lift driver; ross carrier driver; highway water and fuel drivers (4,000 gallons but less than 6,000 gallons); stock room clerk; tireman.

Group 4: Transit-mix trucks (6 yds. or more); dump trucks (over 22 yds. water level); trucks (legal payload capacity 30 tons and over); fuel and water trucks (6,000 gallons and over).

Group 5: Drivers of trucks and trailers in combination (seven axles or more).

Group 6: All offroad equipment; truck repairmen and drivers of road oil spreader trucks; D.W. 10 and D.W. 20 euclid-type equipment, letourneau pulls, terra cobras and similar types of equipment; also PB and similar-type trucks when performing work within Teamsters' jurisidiction, regardless of types of attachment inlcuding power unit pulling off highway belly dumps in tandem.

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR 5.5(a)(1)(v)).

In the listing above, the "SU" designation means that rates listed under that identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate)

ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator

(See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U. S. Department of Labor
200 Constitution Avenue, N. W.
Washington, D. C. 20210

4.) All decisions by the Administrative Review Board are final.

END OF GENERAL DECISION

SECTION 01200

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASME INTERNATIONAL (ASME)

ASME B18.2.1	(1996) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(1987; R 1993) Square and Hex Nuts (Inch Series)

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-2246	(Rev B) Paint, Latex
CID A-A-2336	(Rev A) Primer Coating (Alkyd, Exterior Wood, White and Tints)

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1	(1996) Voluntary Product Standard - Construction and Industrial Plywood

ENGINEERING MANUALS (EM)

EM 385-1-1	(1996) U.S. Army Corps of Engineers Safety and Health Requirements Manual

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 20	(1994; Addenda Jan. 1997) American Softwood Lumbar Standards

1.2 PROJECT FACILITIES

The Contractor shall construct and/or erect the following project facilities as soon as possible and not less than 15 calendar days after notice to proceed.

1.2.1 Construction Signs

The signs shall include the following:

a. Project Signs: One Project Sign at location designated by the

Contracting Officer.

b. Warning Signs: Facing approaching traffic on all haul roads crossing under overhead power transmission lines.

c. Hard Hat Signs: Ten hard hat signs at locations directed.

1.2.2 Bulletin Board

Bulletin board shall be erected at the Contractor's office.

1.2.3 Sanitary Facilities

Suitable sanitary facilities shall be provided and maintained by the Contractor.

PART 2 PRODUCTS

2.1 CONSTRUCTION SIGNS

2.1.1 Materials

2.1.1.1 Lumber

NIST PS 20, and shall be seasoned Douglas Fir, S4S, Grade D or better except that posts, braces and spacers shall be construction Grade (WCLB).

2.1.1.2 Plywood

DOC PS 1, grade A-C, Group 1, exterior type.

2.1.1.3 Bolts, Nuts and Nails

Bolts shall conform to ASME B18.2.1, nuts shall conform to ASME B18.2.2, and nails shall conform to commercially available supplies.

2.1.1.4 Paints and Oils

Paints shall conform to CID A-A-2336 for primer and CID A-A-2246 for finish paint and lettering.

PART 3 EXECUTION

3.1 CONSTRUCTION OF SIGNS

3.1.1 Project and Hard Hat Signs

Constructed as detailed in Figures 1,2,3 and Safety Signs. Decals signs will be furnished by the Contracting Officer.

3.1.2 Warning Signs

Constructed of plywood not less than 13 mm thick and shall be securely bolted to the supports with the bottom of the sign face 1 m above the ground. The sign face shall be 0.60 m x 1.20 m, all letters shall be 100

mm in height, and the wording shall be: "WARNING: OVERHEAD TRANSMISSION LINES."

3.2 PAINTING SIGNS

All exposed surfaces and edges of plywood shall be given one coat of linseed oil and be wiped prior to applying primer. All exposed surfaces of signs and supports shall be given one coat of primer and 2 finish coats of white paint. Except as otherwise indicated, lettering on all signs shall be black and sized as indicated.

3.3 PROJECT ENGINEER'S OFFICE EQUIPMENT

Contractor shall provide computer software (3.5" floppy disc size) to the Contracting Officer for the type of scheduling system to be used and quantity/fill programs for tracking or estimating bid quantities during construction. Scheduling software must be capable of downloading completely to the COE Standard Data Exchange Format. The Contractor shall utilize a hand held radio system for communication between the Contractor's quality control representative and the Government's quality assurance representative. Radio equipment for the Government's use shall include a hand held radio, two batteries and one charger. The Contractor shall provide Government personnel with the following equipment for the duration of the contract: 1 Cellular telephone with voice mail, 2 nickel cadmium batteries, 1 desk top charger, 1 travel charger, and 400 minutes of air time per month or portion thereof.

3.4 BULLETIN BOARD

A weatherproof bulletin board, approximately 915 mm wide and 760 mm high, with hinged glass door shall be provided adjacent to or mounted on the Contractor's project office. If adjacent to the office, the bulletin board shall be securely mounted on no less than 2 posts. Bulletin board and posts shall be painted or have other approved factory finish. The bulletin board shall be easily accessible at all times and shall contain wage rates, equal opportunity notice, and such other items required to be posted.

3.5 MAINTENANCE AND DISPOSAL OF PROJECT FACILITIES

The Contractor shall maintain the project facilities in good condition throughout the life of the project. Upon completion of work under this contract, the facilities covered under this section will remain the property of the Contractor and shall be removed from the site at his expense.

3.6 SCRAP MATERIAL

Materials indicated to be removed and not indicated to be salvaged, stored or reinstalled are designated as scrap and shall become the property of the Contractor and be removed from the site of work. The Contractor by signing this contract hereby acknowledges that he made due allowance for value, if any, of such scrap in the contract price.

3.7 ARCHAEOLOGICAL FINDINGS DURING CONSTRUCTION

Should the Contractor or any of his employees in the performance of this contract find or uncover any archaeological remains, he shall notify the

Project Engineer immediately. Such notifications will be a brief statement in writing giving the location and nature of the findings. Should the discovery site require archaeological studies resulting in delays and/or additional work, the Contractor will be compensated by an equitable adjustment under the CONTRACT CLAUSES of the contract.

3.8 PROTECTION OF EXISTING WORK

Before beginning any cutting or removal work, the Contractor shall carefully survey the existing work and examine the drawings and specifications to determine the extent of the work. The Contractor shall take all necessary precautions to insure against damage to such work to remain in place, to be reused, or to remain the property of the Government, and any damage to such work shall be repaired or replaced as approved by the Contracting Officer at no additional cost to the Government. The Contractor shall carefully coordinate the work of this section with all other work and construct and maintain shoring, bracing and supports, as required. The Contractor shall insure that structural elements are not overloaded and be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under any part of this contract.

3.9 PUBLIC UTILITIES, NOTICES, AND RESTRICTIONS

3.9.1 General

The approximate location of all railroads, pipelines, power and communication lines, and other utilities known to exist within the limits of the work are indicated on the drawings. The sizes, locations, and names of owners of such utilities are given from available information, but their accuracy is not guaranteed. Except as otherwise indicated on the drawings, all existing utilities will be left in place and the Contractor shall conduct his operations in such a manner that the utilities will be protected from damage at all times, or arrangements shall be made by the Contractor for their relocation at the Contractor's own expense. The Contractor shall be responsible for any damage to utilities known to exist and shall reimburse the owners for such damage caused by his operations.

3.9.2 Relocation or Removal

Utilities to be relocated or removed not as part of this contract are designated "To be Relocated by Others" or "To be Removed by Others", respectively. Utilities shown on the plans and not so designated will be left in place and be subject to the provisions of the CONTRACT CLAUSE: PROTECTION OF EXISTING VEGETATION, STRUCTURES, UTILITIES, AND IMPROVEMENTS. The Contractor may make arrangements with the owner for the temporary relocation and restoration of utilities not designated to be relocated, or for additional work in excess of the work needed to relocate utilities designated for relocation at no additional cost to the Government.

3.9.3 Utilities Not Shown

If the Contractor encounters, within the construction limits of the entire project, utilities not shown on the plans and not visible as of the date of this contract and if such utilities will interfere with construction operations, he shall immediately notify the Contracting Officer in writing to enable a determination by the Contracting Officer as to the necessity for removal or relocation. If such utilities are left in place, removed or

relocated, as directed by the Contracting Officer, the Contractor shall be entitled to an equitable adjustment for any additional work or delay.

3.9.4 Coordination

The Contractor shall consult and cooperate with the owner of utilities that are to be relocated or removed by others to establish a mutual performance schedule and to enable coordination of such work with the construction work. These consultations shall be held as soon as possible after award of the contract or sufficiently in advance of anticipated interference with construction operations to provide required time for the removal or relocation of affected utilities.

3.9.5 Notices

3.9.5.1 Utilities To be Relocated or Protected

Unless otherwise specified, the Contractor shall notify the Contracting Officer, in writing, 14 calendar days prior to starting work on any utility to be relocated or protected. On each relocation, notification shall include dates on which the Contractor plans excavation, by-pass work, removal work and/or installation work, as applicable. The Contractor shall also notify the following representatives of utility owners not less than 7 days prior to the start of work in the vicinity of their respective utilities.

Mr. Bucky Faulkner
Clark County Sanitation District
5857 E. Flamingo Road
Las Vegas, NV
Telephone: (702)434-6601

Mr. Tom Carden
Southwest Gas Corporation
4300 W. Tropicana Avenue
Las Vegas Nevada
(702)365-2180
Underground Service Alert
(800)227-2600

Ms. Kimberly Granath-Musil
Cox Communications
121 S. Martin L. King Blvd.
Las Vegas, NV 89106
(702)384-8084, ext 356

Mr. Dean Whitman
US Sprint
3300 S. Valley View Boulevard
Las Vegas, NV 89152
(702)244-7808

Ms. Tina Furlong
Nevada Power Company
6770 W. Flamingo Road
Las Vegas, NV 89151
(702)252-4815

3.9.5.2 Bench Marks and R/W Markers

The Contractor shall notify the Contracting Officer, in writing, 7 days in advance of the time he proposes to remove any existing bench mark or right-of-way marker.

3.9.5.3 Environmental Assessment Requirement

In order to satisfy the Environmental Assessment for this project, the Contracting Officer is required to have a qualified biologist on site at all times while clearing and grubbing operations are in progress. The Contractor shall notify the Contracting Officer 14 calendar days prior to the start of clearing and grubbing activities so that a biological monitor shall be required to walk immediately in front of the Contractors' clearing and grubbing equipment to survey for the threatened desert tortoise and state protected and BLM sensitive Gila monster. For scheduling purposes, the Contractor shall coordinate and complete all clearing and grubbing activities within one four-workday period.

3.9.5.4 Spill Reporting

The Contractor shall notify the Contracting Officer immediately after any spill, regardless of quantity, including all personnel exposures. The Contractor shall submit a written notification not later than 7 calendar days after the initial notification. The written notification shall include the following:

a. Item spilled, leaked or releases in an unauthorized manner (Identification, Quantity and Manifest Numbers).

b. Whether the amount spilled, leaked or released in an unauthorized manner is EPA reportable and, if reported, a copy of the report.

c. Exact location of the spill, leak or unauthorized release.

d. Nature of exposure to personnel.

e. Containment procedures initiated.

f. Anticipated cleanup and disposal procedure.

g. Disposal location of spill, leak or unauthorized release residue.

3.9.6 Restrictions

3.9.6.1 Other Agency Representatives

Personnel representing owners and other agencies may be present for various portions of the work. However, the Contractor will be responsible only to the Contracting Officer.

3.9.6.2 Traffic Control Plan

The Contractor shall develop a Traffic Control Plan and obtain an approval from the Clark County Department of Public Works prior to construction. The plan shall include details of truck haul routes.

3.9.6.3 Existing Roads

The construction schedule shall be prepared giving full consideration to maintaining traffic on existing roads. Additional work on the existing roads may be performed by others during the life of this contract.

3.9.6.4 Access and Haul Roads

Access and haul roads shall be proposed so that use of existing residential streets are minimized.

3.9.6.5 Public and Private Roads

When it is necessary to operate on existing roads outside the construction area, all necessary permits shall be obtained from the appropriate private or public authority. Work shall be conducted in such manner so as to obstruct and inconvenience traffic on existing roads outside the construction limits as little as possible. Spillage of earth, dusty materials, boulders, and mud on project roads or other road will not be permitted. If spillage cannot be prevented, the spillage shall be immediately removed and such areas shall be kept clear throughout the workday. At the conclusion of each workday, such traveled areas shall be cleared of spillage, boulders, and mud.

3.9.6.6 Maintenance of Roads

All haul and access roads, within the construction area, including the borrow areas, shall be maintained to provide vehicular access for the Government's vehicles and the Contractor's vehicles and equipment. Road maintenance shall include rock/mud slides, washouts, and any incident which would restrict vehicular/equipment access. Prior to any alterations of any road alignment, the Contractor shall receive an approval from the Contracting Officer. Road maintenance and alterations shall be performed by the Contractor at no additional cost to the Government.

3.9.6.7 Traffic Safety

In accordance with CONTRACT CLAUSE: ACCIDENT PREVENTION, signs, barricades, and warning devices shall be provided, installed, and maintained as are required for protection of vehicular traffic at any location where operations interfere with public roads. Signs, barricades, lights, and signals, shall be in conformance with Part VI of the U.S. Department of Transportation Manual on Uniform Traffic Control Devices for Streets and Highways.

3.9.6.8 Rock and Gravel

Rock and gravel for use on haul roads and other facilities may be obtained from any source within the excavation limits, borrow area, or stockpiles, that are within the project boundaries and are not designated for other use. The use of any such source shall be subject to approval by the Contracting Officer.

3.9.6.9 Cooperation with Others

The Contractor shall coordinate his activities and cooperate with other contractors as to not delay or interfere with their work.

3.9.7 Working Hours

The Contractor shall restrict all construction activities to the following schedule:

Monday thru Friday 6:30 a.m. to 7 p.m.
Saturday 8 a.m. to 7 p.m.

No work will be permitted on Sundays or Federal Holidays without the prior written approval from the Contracting Officer.

Disposal area(s) and haul route(s) utilized by the Contractor may require restricted hauling hours. The Contractor is notified that hauling or disposal activities may be restricted to normal business hours (7 a.m. to 4 p.m. in the event that such operations are considered to be disruptive to existing neighborhood safety and noise conditions. In the event that such a situation develops, the Contracting Officer shall notify the Contractor of restrictive hauling and/or disposal times. The Contractor shall develop their schedule for construction so that restrictive hauling times can be absorbed without extending the overall contract completion period.

3.9.8 Construction Water

The Contractor shall be responsible for obtaining water for construction purposes. The Contractor shall be responsible for obtaining approvals from the Las Vegas Valley Water District and for coordination with other projects in the area. The nearest available water source is on **Town Center Drive** near the intersection of **the Beltway (State of Nevada Highway 215) (yellow painted hydrant)**.

3.9.9 Identification of Vehicles

All the Contractor's vehicles shall display suitable permanent identification.

3.9.10 Construction Method Observation

Any construction method, plant, or piece of equipment used on this contract shall not be considered proprietary, and can be inspected or photographed at any time by the Government, regulatory agencies, or any group approved by the Government.

3.9.11 Contractor's Equipment

The planned method of transportation and operation of cranes and other heavy equipment to be used in the performance of this contract shall be submitted for approval by the Contracting Officer. The plan shall include the type, size, loadings of equipment, the proposed transportation routes, and work areas to be used on the project.

3.10 PUBLIC SAFETY

Attention is directed to the CONTRACT CLAUSE: PERMITS AND RESPONSIBILITIES. The Contractor shall provide temporary fencing, barricades, and/or guards, as required, to provide protection in the interest of public safety. Whenever the Contractor's operations create a condition hazardous to the public, he shall furnish at his own expense and

without cost to the Government, such flagmen and guards as are necessary to give adequate warning to the public of any dangerous conditions to be encountered and he shall furnish, erect, or maintain such fences, barricades, lights, signs and other devices as are necessary to prevent accidents and avoid damage or injury to the public. Flagmen and guards, while on duty and assigned to give warning and safety devices shall conform to applicable city, county, and state requirements. Should the Contractor appear to be neglectful or negligent in furnishing adequate warning and protection measures, the Contracting Officer may direct attention to the existence of a hazard and the necessary warning and protective measures shall be furnished and installed by the Contractor without additional cost to the Government. Should the Contracting Officer point out the inadequacy of warning and protective measures, such action of the Contracting Officer shall not relieve the Contractor from any responsibility for public safety or abrogate his obligation to furnish and pay for those devices. The installation of any general illumination shall not relieve the Contractor of his responsibility for furnishing and maintaining any protective facility.

3.11 OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) STANDARDS

The OCCUPATIONAL SAFETY and HEALTH ACT (OSHA) STANDARDS for CONSTRUCTION (Title 29, Code of Federal Regulations Part 1926 as revised from time to time) and the Corps of Engineers General Safety and Health Requirements Manual, EM 385-1-1, are both applicable to this contract. The most stringent requirement of the two standards will be applicable.

3.11.1 Accident Reporting

In accordance with EM 385-1-1, the Contractor shall submit a written summary of worker's compensation claims which have been filled by worker's in connection with work on the project. The summary shall be submitted at the time when the work is approximately 50 percent complete and at project completion. The summary shall include all subcontractors. The Contractor's and subcontractor's compensation insurance carrier shall certify that the summaries are "correct and true".

3.12 PERMITS

3.12.1 General

Reference is made to the article of the contract entitled "Permits and Responsibilities", which obligates the Contractor to obtain all required licenses and permits.

3.12.2 Air Pollution Permit (APP)

The Contractor shall obtain an APP from the Clark County Health Department. A copy of the permit shall be submitted to the Contracting Officer. For further information, contact Ms. Cynthia Mikes at telephone number (702) 383-1276.

3.12.3 National Pollutant Discharge Elimination System (NPDES) Permit

The Contractor shall obtain a NPDES permit from the United States Environmental Protection Agency (USEPA) under the Nation Wide Permit (NWP) program, which requires that a Storm Water Pollution Prevention Plan

(SWPPP) shall be prepared and maintained on-site throughout the construction period. A copy of the plan shall be submitted to the Contracting Officer. In accordance with the NWP, a minimum of two (2) days prior to the start of construction activities, the Contractor shall submit a Notice of Intent (NOI) with fees to the Nevada Division of USEPA. The NOI shall be submitted on the standard EPA Form 3510-6 (8-92), and copies shall be provided to the Contracting Officer. For further information, contact Mr. Robb Saunders at telephone number (775) 687-4670.

3.13 CONTRACTOR SAFETY PERSONNEL REQUIREMENT

3.13.1 General

Full-time, on-site, safety coverage by Contractors shall be required at all times during this contract. The Contractor shall employ at the project site to cover all hours of work at least one Safety and Occupational Health Technician per shift, to manage the Contractor's accident prevention program. In addition, the Contractor shall have one Safety and Occupational Health Professional to manage the overall Safety program. The principal safety person (the Safety Professional) shall report to and work directly for the Contractors on-site top manager, higher level official, or corporate safety office. The Safety and Health staff shall have the authority to take immediate steps to correct unsafe or unhealthful conditions. The presence of a Safety and Health person will not abrogate safety responsibilities of other personnel.

3.13.2 Qualifications for Safety and Health Professional(s)

a. Shall have a degree in engineering or safety in at least a four year program from an accredited school and in addition, shall have been engaged in safety and occupational health for at least two (2) years, no time being credited to these two (2) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health; or

b. Shall have legal registration as a Professional Engineer, Certified Safety Professional, or a Certified Safety Manager, and, in addition, shall have been engaged in safety and occupational health for at lease one (1) year, no time being credited to this one (1) year experience unless at least fifty (50) percent of the time was devoted to safety and occupational health; or

c. Shall have degree other than that specified in (a) above and in addition, shall have been engaged in safety and occupational health for at least three (3) years, no time being credited to these three (3) years unless at least fifth (5) percent of the time each year was devoted to safety and occupational health; or

d. In lieu of a degree, shall have been engaged in safety and occupational health for at least five (5) years, no time being credited to these five (5) years unless at least fifty (50) percent of the time each year was devoted to safety and occupational health.

e. First aid work is not creditable experience.

3.13.3 Qualification for Safety and Health Technicians

a. A bachelors degree in safety or an associated discipline and currently employed in a safety position; or

b. An associate degree in Safety or an associated discipline and currently experience in Safety, and currently employed in a safety position; or

c. Five years field experience in safety or an associated discipline and currently employed in a safety position.

d. First Aid work is not creditable experience.

3.13.4 Names and Duties

The name and qualifications of nominated safety persons shall be furnished to the Contracting Officer (in resume format) for acceptability. A functional description of duties shall be provided prior to the pre-work conference. In addition, a copy of a letter from an authorized official of the Contractor which describes the duties and authority of the safety professional, including delegating sufficient authority to stop work to immediately correct the unsafe or unhealthful conditions.

3.14 NOTICE OF PARTNERSHIP

The Government intends to encourage the foundation of a cohesive partnership with the Contractor and its subcontractors. This partnership will be structured to draw on the strengths of each organization to identify and achieve reciprocal goals. The objectives are effective and efficient contract performance and intended to achieve completion within budget, on schedule, and in accordance with plans and specifications. This partnership would be bilateral in makeup, and participation will be totally voluntary. Any cost associated with effectuating this partnership will be agreed to by both parties and will be shared equally with no change in contract price. To implement this partnership initiative it is anticipated that within 60 days of Notice to Proceed the Contractor's on-site project manager and the Government's Resident Engineer would attend a two day partnership development seminar/team building workshop together with the Contractor's key on-site staff and key Government personnel. Follow-up workshop of 1 to 2 days duration would be held periodically throughout the duration of the contract as agreed to by the Contractor and Government.

3.15 AS-BUILT DRAWINGS

3.15.1 General

The Contractor shall prepare as-built drawings for the government. The as-built drawings shall be a record of the construction as installed and completed by the Contractor. They shall include all the information shown on the contract set of drawings and a record of all deviations, modifications, or changes from those drawings, however minor, which were incorporated in the work, all additional work not appearing on the contract drawings, and all changes which are made after final inspection of the contract work. In the event that the Contractor accomplishes additional work which changes the as-built conditions of the facility after submission of the as-built drawings, the Contractor shall furnish revised and/or additional drawings as required to depict as-built conditions. The requirements for these additional drawings will be the same as for the as-built drawings included in the original submission. The prints shall

show the following information, but not be limited thereto:

a. The location and description of any utility lines or other installations of any kind or description known to exist within the construction area. The location includes dimensions to permanent features.

b. The location and dimensions of any changes within the structures.

c. Correct grade or alignment of roads, structures, or utilities if any changes were made from contract plans.

d. Correct elevations if changes were made in site grading.

e. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, etc.

f. The topography and grades of all drainage installed or affected as a part of the project construction.

g. All changes or modifications that result from the final inspection.

3.15.2 Options

Where contract drawings or specifications allow options, only the option selected for construction shall be shown on the as-built drawings.

3.15.3 Preliminary As-built Drawings

The Contractor shall maintain two (2) sets of full size blueline prints marked-up in red, one for use by the Contractor and one for use by the Government, to show the as-built conditions. The sets of as-built prints shall be kept current and available at the job site at all times. Information to be included on these preliminary drawings shall conform to the requirements as stated above. Prior to submission of each monthly pay estimate, the Contracting Officer and the Contractor will jointly inspect the marked-up as-built prints. Failure to keep the as-built field data current shall be sufficient justification to withhold a percentage from the monthly pay estimate.

3.15.4 Submittal to Contracting Officer For Review and Approval

3.15.4.1 As-Built Drawings for R-4 Detention Basin and Channel

The Government will furnish the Contractor with compact disk(s) (CD-R) containing electronic copies of the contract construction drawing files for the "R-4 Detention Basin and Channel" portion of the Project (Sheets 1-**84**). The electronic files will be in Microstation format (Microstation Computer-Aided Design and Drafting Program, Microstation SE). The Contractor shall give the Government two weeks notice prior to his need for the electronic drawing files. The Contractor shall use the electronic files to generate as-built drawings. Not later than two weeks after acceptance of the Project by the Government, the Contractor shall deliver to the Contracting Officer one (1) set of marked-up preliminary as-built

drawings, two (2) full size sets of blueline prints and one (1) set of paper or mylar reproducible prints of the as-built drawings. The Contractor shall also submit compact disk(s) containing electronic copies of the as-built drawing files in the same Microstation format as the files furnished. If upon review, the drawings are found to contain errors and/or omissions, the Contractor will be notified and the electronic as-built drawing files will be returned to the Contractor for corrections. The Contractor shall complete the corrections and return two (2) sets of corrected as-built electronic drawing files on compact disk(s), and one (1) full size blueline print of the as-built drawings to the Contracting Officer within ten (10) calendar days.

3.15.4.2 As-Built Drawings for Village 18 R-4 Channel Utility Interconnects 2001

Not later than two weeks after acceptance of the Project by the Government, the Contractor shall deliver to the Contracting Officer two (2) sets of red-lined, full size, marked-up preliminary as-built drawings for the "Village 18 R-4 Channel Utility Interconnects 2001" portion of the Project. If upon review, the drawings are found to contain errors and/or omissions, the Contractor will be notified and the as-built drawings will be returned to the Contractor for corrections. The Contractor shall complete the corrections and return the two (2) sets of corrected as-built red-lined drawings to the Contracting Officer within ten (10) calendar days.

3.15.4.3 As-Built Drawings for Western Segment Las Vegas Beltway - Hualapai to Sahara, Multi-Use Trail

Not later than two weeks after acceptance of the Project by the Government, the Contractor shall deliver to the Contracting Officer two (2) sets of red-lined, full size, marked-up preliminary as-built drawings for the "Western Segment Las Vegas Beltway - Hualapai to Sahara, Multi-Use Trail" portion of the Project. If upon review, the drawings are found to contain errors and/or omissions, the Contractor will be notified and the as-built drawings will be returned to the Contractor for corrections. The Contractor shall complete the corrections and return the two (2) sets of corrected as-built red-lined drawings to the Contracting Officer within ten (10) calendar days.

3.16 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER (ER 415-1-15, 31 OCT 89)

a. This provision specifies the procedure for determination of time extensions for unusually severe weather in accordance with the CONTRACT CLAUSE: DEFAULT (FIXED PRICE CONSTRUCTION). In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

(2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the Contractor.

b. The following schedule of monthly anticipated adverse weather

delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DAYS
Work Days Based on five (5) Day Work Week

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
6	2	2	1	1	0	2	2	1	1	1	3

c. Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the Contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. The number of actual adverse weather days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day of each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in subparagraph b, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the CONTRACT CLAUSE: DEFAULT (FIXED PRICE CONSTRUCTION).

3.17 REQUIRED INSURANCE

The Contractor shall procure and obtain during the entire period of his performance under this contract the following minimum insurance:

a. General Public Liability insurance for bodily injury and property damage with minimum limits of $1,000,000 combined single limit per occurrence and $1,000,000 annual aggregate for bodily injury to or death, personal injury and property damage.

b. Automobile Liability insurance for bodily injury and property damage with minimum limits of $1,000,000 combined single limit for each occurrence and $1,000,000 annual aggregate.

c. Either Workman's Compensation or Employer's Liability insurance with a minimum limit of $1,000,000.

In every case the insurance coverage shall amount to at least the limits stated above. However, where the Financial Responsibility Compulsory Insurance Law of the State in which the installation is located requires higher limits, the Automobile Liability Insurance Policy should provide coverage of at least those limits. County of Clark, a political subdivision of the state of Nevada, Clark County Regional Flood Control District, and Montgomery Watson shall be named as additional insured parties and all policies issued in performance of work under this contract.

The Contractor does hereby agree to indemnify, defend, and save harmless Clark County, Clark County Regional Flood Control District, U.S. Army Corps

of Engineers and Montgomery Watson from loss, damage, liability, costs, or expense to the proportionate extent caused by the Contractor, his employees, agents, or consultants and/or consultants arising out of its performance of this contract, including, but not limited to the negligent acts, errors, omissions, or intentional misconduct of the Contractor, its employees, agents or consultants and/or subconsultants in connection with this contract.

Contractor further does hereby agree, as a precaution to the performance of any work under this contract and as a precaution to any obligation of Clark County to make any payment under this contract, to provide Clark County with a certificate and/or a certificate issued by the State Industrial Insurance System (SIIS) in accordance with Nevada Revised Statute 616.280.

Contractor agrees to maintain required workers compensation throughout the entire term of the contract. If Contractor does not maintain coverage throughout the entire term of the contract, Contractor agrees that Owner may, at any time the coverage is not maintained by Contractor, order the Contractor to stop work, assess liquidated damages as defined herein, suspend the contract, or terminate the contract. For each six month period this contract is in effect, Contractor agrees, prior to the expiration of the six month period, make another written request to SIIS for the provisions of a certificate and notice of lapse in or nonpayment of coverage. If Contractor does not make the request or does not provide the certificate before the expiration of the six month period, Contractor agrees that owner may order the Contractor to stop work, suspend the contract or terminate the contract.

3.18 SPECIAL CONSTRUCTION REQUIREMENTS

The Contractor shall restrict his operation and adapt his construction schedule to accommodate the following:

3.18.1 Detention Basin Construction Schedule

The Contractor shall not begin activities on BLM property for the construction of the detention basin, beginning with plant salvaging operations, until after October 1, 2001.

3.18.2 Project Limits

The Contractor's work, employee parking, operations, staging, equipment assembly and maintenance, and other on-site activities shall be restricted to actual areas of construction within the Project Limits. The Project Limits of the R-4 Detention Basin and Channel are indicated on the drawings, and constitute the maximum limits of the construction area available for Contractor's operations. The Project Limits are generally defined by the Right-of-Way (R/W) and adjoining Temporary Construction Easements (TCE) as shown on the plans, unless designated otherwise (either in the plans, in these Specifications or by the Contracting Officer).

The Contractor shall be solely responsible for obtaining agreements with and acquisition from adjacent land owners, when additional land or access points are required to supplement the Contractor's operations or staging needs. No appurtenances or other public access facilities (either temporary or permanent) shall be constructed beyond the Project Limits.

3.18.3 Existing Roads

3.18.3.1 Flamingo Road

The Contractor shall maintain public access along Flamingo Road at all times during this contract. Signs and reflective barriers are to be used as required to allow safe passage.

3.18.4 Coordination with Other Contractors

3.18.4.1 The Ridges at Summerlin

The Contractor is advised that The Ridges, golf course community at Summerlin is currently under construction. Work to be performed under that contract consists of construction of golf course, subdivision, related utilities and connector roads.

3.18.4.2 Sunset Ridge and Granite Peaks Subdivisions

The Contractor is advised that site grading and other improvements for the Sunset Ridge and Granite Peaks Subdivisions are underway and on going. Residential house pads, extending into the TCE on the north side of the R-4 Channel between the Las Vegas Beltway and Flamingo Rd have been constructed to grade and over built in some cases, and are previously certified for construction. The R-4 Contractor operations on these previously certified construction pads shall be limited to those activities which maintain the integrity of certified building pads. Upon completion of channel backfill activities within this area, the certified building pads shall be graded to their original configuration. In the event that existing building pads are disturbed due to excavation activities, the R-4 Contractor shall have all disturbed building pads re-certified to the same local building standard.

3.18.5 Runoff R-4 Detention Basin and Channel

The work areas for both the channel and basin will occur in areas that are subject to flowing waters as a result of rainfall. In addition, the channel work area is subject to flowing waters as a result of irrigation runoff and other construction related activities (new development). The R-4 Contractor is advised that it is their responsibility to protect their work from these probable events. In addition to these and other coordination issues discussed herein, see also specification section 02100 "Diversion and Control of Water". See also paragraph National Pollution Discharge Elimination System (NPDES) Permit.

3.18.5.1 Runoff Side Drains

The R-4 Contractor shall anticipate storm (and nuisance) runoff coordination from side drains and at side drain locations along the R-4 Channel. Some side drains and laterals are active while others will become active during the life of the R-4 project. The R-4 Contractor shall conduct construction activities with full coordination of these runoff waters and shall safely allow them to pass without inundating other areas of adjacent development. Drainage from side drains, laterals and all future side drain locations shall not be interrupted.Text

3.18.6 Temporary Construction Easements of Concern

The left side (looking downstream) R-4 Channel construction TCE from the Las Vegas Beltway to Flamingo (Sta 11+30 to Sta 17+70) and the left side

(looking downstream) Flamingo Lateral construction TCE from Sta 10+00 to Sta 11+00) shall expire on 1 Dec 01. The Contractor shall complete all channel concrete construction and channel backfill through these two areas no later than 1 Dec 01 so that the TCE may be vacated.

3.18.7 Perimeter Wall by Others

The R-4 Contractor is advised that a perimeter masonry block wall may be constructed (by others) along the north R-4 Channel Right of Way line after 1 Dec 01, but prior to the overall R-4 contract completion. The R-4 Contractor shall coordinate this perimeter wall construction with all remaining R-4 construction activities.

3.18.8 West Loop Road Construction Access for Others

The West Loop Road (Marble Ridge) is required to have continuous construction access for others across the R-4 Channel alignment. This shall include an asphalt paved golf cart path for continuous golf cart access. The R-4 Channel Contractor shall be required to construct the West loop Road RCB in two phases and ensure that the golf cart path is reconfigured during both phases so that golf course activities are not interrupted. Improvements for the permanent West Loop Road, north of the R-4 Channel, are anticipated to commence (by others) in Oct 2001.

3.18.9 East Loop Road Construction Access for Others

The East Loop Road (Granite Ridge) is required to have continuous construction access for others across the R-4 Channel alignment. This shall include an asphalt paved golf cart path for continuous golf cart access. The R-4 Channel Contractor shall be required to construct the East Loop Road RCB in two phases and ensure that the golf cart path is reconfigured during both phases so that golf course activities are not interrupted.

3.18.10 East Loop Road Shared Haul Route With Others

The East Loop Road (Granite Ridge) which circles the south side of the R-4 Channel to the West Loop Road, shall be a shared haul route for both the R-4 Channel Contractor and other Contractors in the area. Coordination and use and maintenance of this road shall be coordinated with the other Contractors performing work in this area.

3.18.11 Village 18 Golf Course Celebration R-4 Work Stoppages

The Village 18 Golf Course is anticipated to open for use by members and others on 1 Nov 2001. During the R-4 Channel project construction period, various celebrations and other golf course functions shall be undertaken by other parties which may necessitate channel shut down activities for construction. The R-4 Channel Contractor should anticipate up to three (3) work days wherein channel construction activities are stopped due to these golf course functions. These shut down periods shall not be considered a delay to the R-4 Channel project and shall not be considered as delays which constitute a modification to this contract. In preparing the R-4 Channel Construction schedule, the Contractor shall incorporate these anticipated delays into the overall required completion of the contract work.

3.18.12 Flamingo Road Construction Activities and Access

Flamingo Road is required to have continuous construction access for others across the R-4 Channel alignment. This shall include activities for the permanent Flamingo Road construction both north of and through the R-4 Channel alignment. The R-4 Channel RCB construction through Flamingo is required to be phased so that construction and public access is maintained at all times to include temporary asphalt pavement as required. The Flamingo Road improvements are anticipated to be completed by 1 Nov 2001 by others. Flamingo Road improvements through the R-4 Channel work area are anticipated to be limited to earthwork and asphalt. The R-4 Channel Contractor shall restore Flamingo Road to match existing conditions at the completion of the RCB through this area.

3.18.13 Temporary Construction Easements Adjacent to Golf Courses

The R-4 Channel construction adjacent to various golf course improvements shall be completed to the point where the TCEs may be released by 1 Mar 02 so that golf course landscaping activities (by others) may commence during the spring growing season. The TCE areas shall be graded by the R-4 Contractor to the required finish grades identified by the contract drawings prior to 1 Mar 02. The TCE areas adjacent to golf course improvements required to be vacated by 1 Mar 02 include the following: East Loop Road Upstream RCB Headwall (Sta 21+22.426) to Sta 22+00 on the south side and Sta 22+40 on the north side; the West Loop Road Upstream RCB Headwall (Sta 32+07.532) to Sta 32+80 on the north side and Sta 33+20 on the south side; and the West Loop Road Downstream Headwall (Sta 31+64.532) to Sta 28+60 on the south side.

3.18.14 New Water Line (for Village 18) Work Deadline

The new water line work (reference the GC Wallace Village 18 Drawings) included in this contract shall be completed by 1 Mar 02 so that it may become operational for use by others.

3.18.15 Excess Material From Multi-Use Trail

Excess excavated material originating from the construction of the Multi-Use Trail (reference the VTN Multi-Use Trail Plan Drawings) shall be disposed in one of the two R-4 Channel Disposal Sites. The R-4 Channel Contractor is advised that Desert Inn, Sahara and Town Center are all currently active and open streets to the Public. Haul routes shall be coordinated through the development of traffic control plans submitted to and approved by Clark County Department of Public Works.

3.18.16 Diversion Berm Protecting Golf Courses

The Village 18 Developer has created a diversion berm to protect golf course holes in the vicinity of Channel Sta 34+30. This berm encroaches into the R-4 Channel Right of Way and TCE areas. The R-4 Channel Contractor shall coordinate construction activities in this area to ensure that berm protection for the golf course is maintained at all times until discharge waters form the R-4 Basin are safely released in to the new R-4 Channel.

3.18.17 BLM Lands Materials and Howard Hughes Properties (HHP) Lands Materials

All excavated materials from BLM Lands will remain on BLM Lands, while all materials from HHP Lands will remain on HHP Lands. Materials shall not be

temporarily transported across property boundaries.

-- End of Section

SECTION 01250

MEASUREMENT AND PAYMENT

PART 1 GENERAL

BASE BID

The contract price and payment shall constitute full compensation as stated in the Contract Clause, CONTRACT PRICES - BIDDING SCHEDULES, for completion of the work. No separate payment will be made for any material or work necessary to complete the work that is not specifically mentioned, such materials and work shall be considered incidental to all bid items. As stated in Contract Clause, SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, the word "provided" shall be understood to mean "furnished and installed" when used in this section or elsewhere in the technical sections.

1.1 TRAFFIC CONTROL (Bid Item 0001)

Payment for Traffic Control will be made at the applicable contract price, which payment shall constitute full compensation for traffic control including but not limited to earthwork and grading for construction and removal of temporary roadways; providing safety barriers; providing traffic warning and control signs and flagmen as required.

1.2 DIVERSION AND CONTROL OF WATER (Bid Item 0002)

Payment for Diversion and Control of Water will be made at the applicable contract price, which payment shall constitute full compensation for control of storm water runoff to prevent adverse impacts to the project or downstream properties.

1.3 CONSTRUCTION WATER (Bid Item 0003)

Payment for Construction Water will be made at the applicable contract price, which payment shall constitute full compensation for furnishing construction water for the work including cost of permits, cost of water taps or hydrants, applicable earthwork, design and installation of temporary water pipeline and storage tanks, maintaining and repairing the water supply system and all incidentals, complete.

1.4 CLEAR SITE AND REMOVE OBSTRUCTIONS (Bid Item 0004)

Payment for Clear Site and Remove Obstructions will be made at the applicable contract price, which payment shall constitute full compensation for clearing debris and grubbing areas of excavation, fill, or other approved areas necessary for the Contractor's operations within the limits of the designated temporary construction easement, the protection of existing facilities to remain in place, and any necessary restoration after plant salvaging has been completed. Unnecessary clearing will not be permitted. This work will not include clearing grasses, weeds and stripping of surface soils to be paid separately under Bid Item 0005. This works shall include disposal off-site of all existing debris such as old pavement, tree trimmings, trash, etc. This work shall also include the protection in place, or restoration, of existing facilities that are to

remain in place.

1.5 STRIP AND STOCKPILE TOPSOIL (Bid Item 0005)

Payment for Strip and Stockpile Topsoil will be made at the applicable contract price per cubic meter, which payment shall constitute full compensation for stripping and stockpiling surface soils, including clearing of grasses and weeds, after plant salvaging operations, as indicated in the specifications.

1.6 EXCAVATION (Bid Item 0006-0007)

1.6.1 Measurement

A survey of the site shall be made prior to commencement of work, and all measurements will be based on this survey without regard to any changes in the site that may be made between the excavation lines and grades indicated on the drawings or staked in the field and the ground surfaces as indicated by the above mentioned survey. Measurement shall be based on difference between surveyed original grade and limits of excavation less amount for Strip and Stockpile Topsoil. The actual slopes as excavated may be greater or less than those indicated or staked, depending on the materials excavated and methods used in performing the work, but such alterations shall not change the measurement for payment from the original lines as specified herein. The quantity of directed excavation necessary for the removal of unsatisfactory foundation material as specified shall be included in the measurement of the excavation where the unsatisfactory soils are encountered. Quantities will be computed in cubic meters by the average end area method and the planimeter will be considered a precise instrument for measurement of plotted cross sections. The Contractor has the option of using computer methods for quantity estimations, but all computer methods of quantity estimations shall be approved by the Contracting Officer. All excavation outside of excavation lines shown on the drawings will be considered as being for convenience of the Contractor.

1.6.2 Payment

Payment for Excavation will be made at the applicable contract price, which payment shall constitute full compensation for excavation for the dam and spillway foundation, inspection trench, detention basin, channel, roads and other areas as indicated on the drawings including shoring, blasting, rock excavation, and cemented alluvium excavation; shaping and trimming of areas to receive riprap, concrete and roller compacted concrete; loading, stockpiling, crushing, processing, hauling, and dumping suitable materials for fills for the dam embankment, and backfill for structures and pipes; and loading, stockpiling, hauling, placing and grading satisfactory excavated materials in the graded basin area as shown on the drawings or as directed. Payment will not be included for excavation (including shoring) outside the excavation limits indicated on the drawings or staked in the field, and other earthwork requirements for which separate payments are provided.

1.6.2.1 Excavation, Detention Basin

Payment for Excavation, Detention Basin will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for excavation as indicated on the drawings including over excavation and subgrade and foundation preparation for the dam embankment.

1.6.2.2 Excavation, Channel

Payment for Excavation, Channel will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for excavation and haul of excess material to disposal sites as indicated on the drawings.

1.6.2.3 Subgrade or Foundation Preparation

No separate payment will be made for subgrade or foundation preparation and all costs in connection therewith shall be included in the contract prices for excavation or the items to which the work applies.

1.6.2.4 Unsatisfactory Soils

No separate payment will be made for the excavation and disposal of unsatisfactory soils. When such excavation is directed, payment will be made based on the contract unit prices for excavation and fills.

1.6.2.5 Excavation for Structures

No separate payment will be made for excavation for structures such as manholes and headwalls. All costs therefore shall be included in the applicable contract item to which the work applies.

1.6.2.6 Trenches

No separate payment will be made for excavation of pipe trenches. All costs therefore shall be included in the applicable contract prices for the items to which the work applies.

1.6.2.7 Shoring

No separate payment shall be made for shoring. The Contractor shall be responsible for method of construction and the use of shoring, stable slope cuts, or other trench safety requirements.

1.7 FILLS (Bid Items 0008 - 0011)

1.7.1 Measurement

Measurement for fills will be made between the excavation and structure lines and the fill limit lines, or between the ground lines and fill lines, as indicated or staked in the field. Quantities will be computed in cubic meters by the average end area method and the planimeter will be considered a precise instrument for measuring plotted cross sections. The Contractor has the option of using computer methods of quantity estimation, but all computer methods of quantity estimation shall be approved by the Contracting Officer.

1.7.2 Payment

1.7.2.1 Compacted Fill, Dam Embankment

Payment for Compacted Fill, Dam Embankment will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for shaping, grading, foundation preparation backfill, and

compacting the fill, complete. Payment will not be included for fills outside the fill limits indicated on the drawings or staked in the field, and other fill requirements for which separate payments are provided.

1.7.2.2 Compacted Fill, Channel

Payment for Compacted Fill, Channel, will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for shaping, grading, and compacting the fill, complete. Payment will not be included for fills outside the fill limits indicated on the drawings or staked in the field, and other fill requirements for which separate payments are provided.

1.7.2.3 Compacted Fill, Roadways

Payment for Compacted Fill, Roadways, will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for shaping, grading, and compacting the fill, complete. Payment will not be included for fills outside the fill limits indicated on the drawings or staked in the field, and other fill requirements for which separate payments are provided.

1.7.2.4 Trenches

No separate payment will be made for backfilling pipe including bedding material, selected granular material, or initial backfill material. All costs in connection therewith shall be included in the contract prices for items to which the work applies.

1.7.2.5 Miscellaneous Fill

Payment for Miscellaneous Fill, will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for placing, shaping, and grading the fill, complete.

1.7.2.6 Backfill About Structures

No separate payment will be made for backfill about structures. All such costs shall be included in the applicable contract prices for items to which the work applies.

1.7.2.7 Subgrade Preparation

No separate payment will be made for subgrade preparation for areas of fill, and all costs in connection therewith shall be included in the contract prices.

1.8 FILTER MATERIAL (Bid Item 0012)

1.8.1 Measurement

Measurement of Filter Material will be by the cubic meter of filter material placed within the lines and grades indicated on the drawings or as directed.

1.8.2 Payment

Payment for Filter Material will be made at the applicable contract price which payment shall constitute full compensation for furnishing and placing the filter material, complete including subgrade preparation.

1.9 DRAIN MATERIAL (Bid Item 0013)

1.9.1 Measurement

Measurement of Drain Material will be by the cubic meter of drain material placed within the lines and grades indicated on the drawings or as directed.

1.9.2 Payment

Payment for Drain Material will be made at the applicable contract price which payment shall constitute full compensation for furnishing and placing the drain material, complete.

1.10 DETENTION BASIN DUST PALLIATIVE (Bid Item 0014)

1.10.1 Measurement

Measurement of Detention Basin Dust Palliative will be made on the basis of the actual area in hectares of exposed excavation and fill surfaces in the construction areas treated with dust palliative as indicated or directed, excluding revegetation areas treated and paid for separately.

1.10.2 Payment

Payment for the dust palliative will be at the applicable contract price, which payment shall constitute full compensation for the dust palliative including furnishing materials, processing, hauling, and placing, complete in place.

1.11 RIPRAP PLACEMENT FOR SPILLWAY TOE, (Bid Item 0015)

1.11.1 Measurement

Measurement for Riprap Placement for Spillway Toe will be by the metric tonne (1,000 kilograms) of riprap placed at the toe of the spillway to the lines and grades indicated on the drawings.

1.11.2 Payment

Payment for the riprap will be made at the applicable contract unit price per metric tonne, which payment shall constitute full compensation for work required for installation of riprap, furnishing and placing the riprap, complete.

1.12 REINFORCED CONCRETE PIPE (Bid Items 0016 - 0021)

1.12.1 Measurement

Provide reinforced concrete piping as shown on the drawings. The Work shall consist of a complete installation. All excavation, bedding material, backfill, compaction of bedding and backfill, caps and marker posts, and all other trenching related work shall be included. Any trench

excavation greater than 1.524 meters deep (vertical wall) shall be braced in accordance with Section 02316, 3.1.1. The pipe shall be measured along the flow line. Laying the pipe to line and grade, grouting in the joints and all other piping installation work shall also be included. All labor, equipment, and material costs shall be included in the price per meter for each size and class of RCP.

1.12.2 Payment

Payment for Reinforced Concrete Pipe will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for the installation, including excavation, bedding and backfill materials and placement, laying the pipe, including junction of pipe to channel or slotted chamber, mortaring the joints, compaction of bedding and backfill materials under, around, and over the pipe, caps and marker posts, complete and in place.

1.13 STEEL SLEEVE (Bid Items 0022 - 0024)

1.13.1 Measurement

Provide steel sleeve pipe as shown on the drawings. The Work shall consist of a complete installation including caps and marker posts. All excavation, bedding material, backfill, compaction of bedding and backfill, and all other trenching related work shall be included. Any trench excavation greater than 1.524 meters deep (vertical wall) shall be braced in accordance with Section 02316, 3.1.1. The pipe sleeve shall be measured along the flow line. Laying the pipe sleeve to line and grade, and all other installation work shall also be included. All labor, equipment, and material costs shall be included in the price per linear meter for each size of steel pipe sleeve.

1.13.2 Payment

Payment for Steel Sleeve will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for the installation of pipe, caps, and marker posts, involving excavation, bedding and backfill materials and placement, laying the pipe, compaction of bedding and backfill materials under, around, and over the pipe, complete and in place.

1.14 CONCRETE ENCASED DUCT BANK (Bid Items 0025 - 0026)

1.14.1 Measurement

Provide concrete encased duct bank as shown on the drawings. The Work shall consist of a complete installation including marker posts. All excavation, bedding material, backfill, compaction of bedding and backfill, and all other trenching related work shall be included. Any trench excavation greater than 1.524 meters deep (vertical wall) shall be braced in accordance with Section 02316, 3.1.1. Laying the conduits to line and grade, concrete encasement and all other installation work shall also be included. All labor, equipment, and material costs shall be included in the price per linear meter for each size of concrete encased duct bank.

1.14.2 Payment

Payment for Concrete Encased Duct Bank will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for the installation, including excavation, bedding and backfill materials and placement, laying conduit and placing concrete encasement, compaction of bedding and backfill materials under, around, and over the concrete encased duct bank, and marker posts, complete and in place.

1.15 PVC SLEEVE (Bid Items 0027 - 0028)

1.15.1 Measurement

Provide PVC sleeve of the size shown on the drawings. The Work shall consist of a complete installation including caps and marker posts. All excavation, bedding material, backfill, compaction of bedding and initial backfill, and all other trenching related work shall be included. Any trench excavation greater than 1.524 meters deep (vertical wall) shall be braced in accordance with Section 02200, 1.4. Laying the pipe sleeve to line and grade, and all other installation work shall also be included. All labor, equipment, and material costs shall be included in the price per linear meter for each size of pipe sleeve.

1.15.2 Payment

Payment for PVC Sleeve will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for the installation of pipe, caps, and marker posts, including excavation, bedding and backfill materials and placement, laying the pipe sleeve, compaction of bedding and backfill materials under, around, and over the pipe sleeve, complete and in place.

1.16 ADJUST MANHOLE FRAME AND COVER (Bid Item 0029)

Measurement and payment shall be made according to the contract unit price for each manhole acceptably adjusted to finished grade elevation. Existing covers, including frames, grates, or lids shall be adjusted to the required elevation by removing such existing covers and adjusting the top of the existing structures by removing or adding concrete, riser, cone, grade rings, or by using cast iron adaptor rings, as the case may be, reinstalling the fixtures by supporting them on a satisfactoy collar of Class A concrete constructed as to hold them firmly in place.

1.17 SANITARY SEWER PIPE (Bid Items 0030 - 0032)

1.17.1 Measurement

The length of Sanitary Sewer Pipe installed will be measured from center to center of manholes and from the center of sewer to the end of the service connections without deduction for fittings or diameters of manholes and will be paid for according to the applicable contract unit price per meter for the size of pipe shown on the drawings. The Work shall consist of a complete installation. All excavation, material, backfill, compaction of bedding and backfill, and all other trenching related work shall be included. Any trench excavation greater than 1.524 meters deep (vertical wall) shall be braced in accordance with Section, 02316, 3.1.1. All labor, equipment, and material costs shall be included.

1.17.2 Payment

Payment for Sanitary Sewer Pipe will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for the installation, including excavation, bedding and backfill materials and placement, laying the pipe, compaction of bedding and backfill materials under, around, and over the pipe, complete and in place. No extra payment will be made for bends. The cost for concrete encasement shall be included when specified in the bid item. No additional payment will be made for Wye branches. The cost will be included in the price per meter of straight pipe. No additional payment will be made for corrections to existing manholes or plugs.

1.18 SANITARY SEWER MANHOLE (Bid Item 33)

Manholes will be paid for according to the applicable contract price including, excavation, backfill and appurtenances complete and in place. No extra payment will be made for pipe fittings required to make connections to manholes.

1.19 WATER LINE (Bid Item 0034)

1.19.1 Measurement

The length of water lines to be paid for will be determined by measuring along the centerlines of the various sizes of pipe furnished and installed. Pipe will be measured from center of fitting to center of fitting. No deduction will be made for the space occupied by valves or fittings. The Work shall consist of a complete installation. All excavation, bedding material, backfill, compaction of bedding and backfill, and all other trenching related work shall be included. Any trench excavation greater than 1.524 meters deep (vertical wall) shall be braced in accordance with Section 02316, 3.1.1. All labor, equipment, and material costs shall be included.

1.19.2 Payment

Payment will be made for water lines at the contract unit price per linear meter for the various sizes of water lines, valves, blow-off assemblies, and will be full compensation for all pipes joints, specials, tees, valve boxes, and fittings, complete in place including excavation, bedding and backfill. Payment will include the furnishing of all testing, plant, labor, and material and incidentals necessary to complete the work, as specified and as shown.

1.20 CONCRETE ENCASEMENT WATER LINE (Bid Item 0035)

Concrete encasement of water line shall be measured and paid per linear meter according to the contract unit price for concrete encasement, and shall include all labor and materials complete and in place.

1.21 AGGREGATE BASE COURSE (Bid Item 0036)

1.21.1 Measurement

Measurement of Aggregate Base Course will be by the metric tonne (1,000 kilograms) of aggregate base course placed within the lines and grades

indicated on the drawings.

1.21.2 Payment

Payment for Aggregate Base Course will be made at the applicable contract unit price per metric tonne, which payment shall constitute full compensation for work required for installation of aggregate base course, furnishing, placing, and compacting the aggregate base course, complete, including subgrade preparation.

1.22 ASPHALT CONCRETE PAVEMENT (Bid Item 0037)

1.22.1 Measurement

Measurement for Asphalt Concrete Pavement will be by the metric tonne (1,000 kilograms) of asphalt concrete pavement placed within the lines and grades as indicated on the drawings.

1.22.2 Payment

Payment for Asphalt Concrete Pavement will be made at the applicable contract price which payment shall constitute full compensation for asphalt concrete pavement in place, complete including tack coat, prime coat and appurtenant work except for aggregate base course. No payment will be made for excessive thickness.

1.23 TYPE "A" GLUE DOWN CURB (Bid Item 0038)

Measurement and Payment for Type "A" Glue Down Curb shall be made at the unit price per linear meter constructed as shown on the plans including all labor, equipment and materials.

1.24 CHAIN LINK FENCING (Bid Item 0039 TO 0046)

1.24.1 Measurement

Measurement of Chain Link Fencing that is provided will be by the linear meter of chain link fencing constructed as shown on the drawings. Gates shall be measured for each type and size acceptably installed.

1.24.2 Payment

Payment for Chain Link Fencing will be made at the applicable contract unit price per linear meter of gage of fabric specified, which payment shall constitute full compensation for chain link fencing, including posts with caps, rail, chain link fabric, stretcher bars, tension bands, wire ties, truss wire, sleeves, grout, and all incidentals, complete as shown on the drawings. Payment for gates will be made at the applicable contract price for each gate including all incidentals, complete as shown on the drawings. Payment shall also include complete removal of temporary fencing at the completion of the project.

1.25 TEMPORARY POLYETHYLENE FENCING (Bid Item 0047)

1.25.1 Measurement

Measurement of Temporary Polyethylene Fencing that is provided will be by

the linear meter of fencing constructed as shown on the drawings.

1.25.2 Payment

Payment for the fencing will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for fencing, including posts, grout, and all incidentals complete as shown on the drawings. Payment shall also include complete removal of temporary fencing at the completion of the project.

1.26 BOLLARDS (Bid Item 0048)

Measurement and payment for Bollards will be made at the applicable contract unit price for each bollard acceptably installed, not including bollards specifically included in lump sum amounts for specified facilities.

1.27 PIPE ACCESS GATES (Bid Item 0049)

1.27.1 Measurement

Measurement of Pipe Access Gates will be the number of single pipe access ramp gates acceptably installed.

1.27.2 Payment

Payment for Pipe Access Gates will be made at the applicable contract price, which payment shall constitute full compensation for fabricating and installing the pipe gates, complete, including posts, pipes, plates, tubes, sleeves, hinges, grout, sign, and all incidentals, complete, as shown on the drawings.

1.28 LADDER SYSTEMS (Bid Item 0050)

Payment for Ladder System will be made at the applicable contract lump sum price for installation of all channel access ladders. The contract price for ladder system shall be considered full payment for fabrication, assembly fittings, finishing, paint and marking, installation of ladder steps, and all equipment, labor and fittings.

1.29 PIPE SAFETY RAILING (Bid Item 0051)

1.29.1 Measurement

Measurement of Pipe Safety Railing that is provided will be by the linear meter of pipe safety railing constructed as shown on the drawings.

1.29.2 Payment

Payment for Pipe Safety Railing will be made at the applicable contract unit price per linear meter, which payment shall constitute full compensation for Pipe Safety Railing, including **galvanized** pipe railing and posts, safety chain gates, galvanized anchor bolt assemblies, fabrication, grout or dry pack, surface preparation and painting **of galvanized rail assemblies from station 18+50 to station 35+12**, **touch up painting of galvanized rails after final assembly, and painting of grout or dry pack after installation,** and all incidentals, complete.

1.30 REINFORCED CONCRETE (Bid Items 0052 - 0054, 0056 - 0065)

1.30.1 Measurement

Measurement of concrete will be made on the basis of the actual volume, in cubic meters, of concrete within the pay lines of the channel slab, channel walls and top slab, as shown on the drawings. Measurement of concrete placed against the sides of any excavation without the use of intervening forms will be made only within the pay lines of the structures. No deductions will be made for rounded or beveled edges or space occupied by metalwork, nor voids or embedded items which are either less than 0.15 cubic meter in volume or one-tenth of square meter in cross section. Concrete wasted or used for the convenience of the Contractor will not be included in measurement for payment.

1.30.2 Payment

Payment for the concrete items will be made at the applicable contract prices for the various items of the schedule, which payments shall constitute full compensation for labor, materials (except reinforcing steel for which separate payment is provided), forming, finishing, curing, joint sealant complete, and for all equipment and tools to complete the concrete work. Embedded items shall be included in the cost of the concrete except when other payment is specifically provided. No payment will be made for concrete, as such, which is placed in structures for which payment is made on a lump sum basis.

1.30.2.1 Channel Slab

Payment for the Channel Slab will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for all concrete placed for the channel slab, keys, and starter walls, complete.

1.30.2.2 Channel Walls

Payment for the Channel Walls will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for all concrete placed above the starter walls in the vertical walls of the channel, and cast-in-place boxes, complete.

1.30.2.3 Top Slab

Payment for the Top Slab will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for all concrete placed for the top slab and headwalls on top of boxes, complete.

1.30.2.4 Confluence Structures

Payment for each Confluence Structure will be made at the applicable contract lump sum price, which payment shall constitute full compensation for each confluence structure, for the reach of the channel and confluence structure specified, complete, furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; and all incidentals, complete as shown on the drawings. Confluence Structure #1 shall be from Station 16+89.629 to Station 17+19.000. Confluence Structure #2 shall be from Station 33+04.394 to Station 33+15.394.

1.30.2.5 Access Ramps

Payment for each Access Ramp will be made at the applicable contract lump sum price for the reach of channel and ramp specified, which payment shall constitute full compensation for each access ramp, including main channel at ramp, complete, furnishing and placing reinforcing steel; furnishing,placing,finishing and curing concrete;and all incidentals, complete as shown on the drawings. Ramp #1 shall be from Station 17+29.111 to Station 17+83.254. Ramp #2 shall be from Station 30+66.624 to Station 31+25.208.

1.30.2.6 Outlet Structure

Payment for the Outlet Structure will be made at the application contract lump sum price, which payment shall constitute full compensation for the outlet structure, complete, including excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete; furnishing and placing trash rack steel constrictor structure; and all incidentals,complete as shown on the drawings.

1.30.2.7 Reinforced Concrete Slotted Chamber

Payment for the Reinforced Concrete Slotted Chamber will be made at the applicable contract price for each slotted chamber which payment shall constitute full compensation for the slotted chamber complete, including slabs and walls (excluding main channel wall), excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, manhole frame and cover and all incidentals, complete as shown on the drawings.

1.30.2.8 Storm Drain Manhole

Payment for the reinforced concrete Storm Drain Manhole will be made at the applicable contract price which payment shall constitute full compensation for the manhole complete, including slabs and walls, excavation and compacted fill; furnishing and placing reinforcing steel; furnishing, placing, finishing and curing concrete, manhole frame and cover and all incidentals, complete as shown on the drawing.

1.31 CONCRETE REINFORCEMENT, CHANNEL (Bid Item 0055)

1.31.1 Measurement

Measurement of reinforcing steel in metric tonnes (1,000 kilograms) is limited to reinforcement in concrete structures paid for on a cubic meter basis and will be made of the lengths of bars actually placed in the completed work in accordance with the plans and specifications, approved bar schedules, or as directed. The measured lengths will be converted to weights for the bar numbers listed by the unit weights per linear foot contained in ASTI A 615. Steel in laps indicated on the drawings, in the specifications, or required by the Contracting Officer will be included in measurement for payment. No measurement will be made for the additional steel in laps which are authorized for the convenience of the Contractor. No measurement will be made of steel supports or spacers. All costs for furnishing and installing supports and spacers shall be included in the various structures requiring the reinforcement.

1.31.2 Payment

Payment for reinforcing steel will be made at the applicable contract price, which payment shall constitute full compensation for furnishing and installing steel reinforcement, complete. No payment will be made for steel reinforcement which is placed in structures for which payment is made on a lump sum basis.

1.32 ROLLER-COMPACTED CONCRETE (Bid Item 0066)

1.32.1 Measurement

Measurement of Roller-Compacted Concrete will be made on the basis of actual cubic meters of roller-compacted concrete placed within the lines and grades indicated on the drawings.

1.32.2 Payment

Payment for Roller-Compacted Concrete will be at the applicable contract price, which payment shall constitute full compensation for the roller compacted concrete including all materials (except Portland Cement and pozzolan for which separate payments are provided), formwork, batching, hauling, placing, compacting, finishing, curing and all equipment and tools to complete the roller compacted concrete in place. Embedded items shall be included in the cost of the roller-compacted concrete except when other payment is specifically provided.

1.33 PORTLAND CEMENT FOR RCC (Bid Item 0067)

1.33.1 Measurement

Quantity of Portland Cement to be paid for will be the number of metric tonnes (1,000 kilograms) of Portland Cement used for roller compacted concrete unless specifically excepted, wasted or used for the convenience of the contractor. The quantity to be paid for will be determined by multiplying the approved weight of Portland Cement in kilograms per cubic meter of roller compacted concrete by the number of accepted cubic meters of roller compacted concrete placed within the lines and grades indicated on the drawings and dividing by 1,000.

1.33.2 Payment

Payments for Portland Cement for RCC will be made at the applicable contract price, which payment shall constitute full compensation for furnishing the Portland Cement ready for use in the work, complete. No payment will be made for Portland Cement used for structures for which separate payment is provided.

1.34 POZZOLAN FOR RCC (Bid Item 0068)

1.34.1 Measurement

Quantity of pozzolan to be paid for will be the number of metric tonnes (1,000 kilograms) of pozzolan used for roller compacted concrete. The quantity to be paid for will be determined by multiplying the approved weight of pozzolan in kilograms per cubic meters of roller compacted concrete by the number of accepted cubic meters of roller compacted

concrete placed within the lines and grades indicated on the drawings and dividing by 1,000.

1.34.2 Payment

Payments for Pozzolan for RCC will be made at the applicable contact price, which payment shall constitute full compensation for furnishing the pozzolan, complete. No payment will be made for pozzolan used for structures for which separate payment is provided.

1.35 STILLING WELL, DETENTION BASIN (Bid Item 0069)

Payment for the Stilling Well, Detention Basin will be made at the applicable contract price, which payment shall constitute full compensation for the stilling well, complete, including excavation and compacted backfill; furnishing and placing reinforcing steel; beehive drop inlets, furnishing 100 mm PVC-coated rigid steel inlet pipes with slurry backfill; connection to existing concrete, including sawcuts and dowels; furnishing, placing, finishing, and curing concrete for, cutoffs, walls, slabs, collars and sills as shown on the drawings, manhole, access door, shelf, ladder and safety cage; and all incidentals.

1.36 STILLING WELL, CHANNEL (Bid Item 0070)

Payment for Stilling Well, Channel will be made at the applicable contract price, which payment shall constitute full compensation for the stilling well, complete, including excavation and compacted backfill; furnishing and placing reinforcing steel; staff gauge; manhole, access door, shelf, furnishing 100 mm PVC coated-rigid steel inlet pipes with slurry backfill; connection to existing concrete, including sawcuts and dowels; furnishing, placing, finishing, and curing concrete for, cutoff, walls, slabs, and sills as shown on the drawings; and all incidentals.

1.37 CHANNEL WEEPHOLE SYSTEM (Bid Item 0071)

Payment for the Channel Weephole System will be made at the applicable contract price, which payment shall constitute full compensation for materials, and installation of the weephole system, complete including applicable earthwork, drain aggregate, geotextile, form openings and appurtenances, complete.

1.38 SEDIMENT STAFF GAGES (Bid Item 0072)

Payment for Sediment Staff Gages will be made at applicable contract unit price for each gage, which payment shall constitute full compensation for fabricating and installing the sediment staff gages, including applicable earthwork, pipes, concrete, and painting, complete.

1.39 BASIN DEPTH GAGE (Bid Item 0073)

Payment for Detention Basin Depth Gages will be made at the applicable contract price which payment shall constitute full compensation for installing the depth gages, complete, including applicable earthwork, reinforced concrete, and placing numerical markings as shown on the drawings.

1.40 MULTI-USE TRAIL PRE-EMERGENT HERBICIDE/DUST PALLIATIVE (Bid Item 0074)

1.40.1 Measurement

Measurement of Multi-Use Trail Pre-Emergent Herbicide/Dust Palliative will be made on the basis of the actual area in hectares surfaces treated with dust palliative as indicated in the Red Rock Trail Drawings or as directed.

The following tasks shall be included in the measurement for payment:

All disturbed areas in the trail corridor not covered by concrete or asphalt shall be treated with a pre-emergent herbicide to discourage the growth of weeds and other vegetation and a dust palliative for soil stabilization.

Prior to the application of the herbicide and dust palliative, all earthen slopes and surfaces shall be finished to the grades shown on the drawings or as directed by the Engineer, including the removal of all existing vegetation and the filling and smoothing of erosional features and surface irregularities. The finished surfaces shall then be scarified to a depth 150 mm of (six inches (6")), compacted, and groomed to produce a smooth surface with all particles greater than 75 mm (three inches (3")) in diameter removed.

Soil surfaces prepared as described above shall then be treated with a pre-emergent herbicide using a mixture of SURFLAN herbicide or approved equal applied at 0.16 liters per hectare (2 gallons per acre) and GALLERY herbicide or approved equal applied at 0.01 liters per hectare6 oz./acre). The soil surface shall then be stabilized using PLASTEX soil stabilization agent or approved equal at a rate of 58 kg per hectare (3 tons/acre). The gypsum used in the soil stabilization material shall be processed to be composed of a crushed, dry calcium sulfate hemihydrate (CA S04, ½ H2O) having a purity of not less than 88 percent. The pre-emergent herbicide and dust palliative shall be watered in per the manufacturer's recommendations.

The Contractor shall add a color pigment to the dust palliative slurry at the time of application. Apply color pigment to match existing ground surface color, at the application rate recommended by the manufacturer.

1.40.2 Payment

Payment for Multi-Use Trail Pre-Emergent Herbicide/Dust Palliative will be at the applicable contract price, which payment shall constitute full compensation including grading, scarifying furnishing materials, processing, and application, complete in place.

1.41 SALVAGE, STORE, MAINTAIN, AND PLACE PLANTS (Bid Items 0075 - 0080)

1.41.1 Measurement

Measurement for salvaging storing, maintaining and placing plants will be the number of plants of each type specified.

1.41.2 Payment

The accepted quantities of plants measured will be paid at the contract unit price bid for the type, identified in each bid item. Such payment shall be full compensation for all the labor, materials and incidentals

necessary to complete the work, except irrigation water to maintain the plants will be paid separately.

1.42 SALVAGE AND TRANSPORT PLANTS FOR BUREAU OF LAND MANAGEMENT (Bid Items 0081 - 0084)

1.42.1 Measurement

Measurement for salvaging and transporting plants to Bureau of Land Management Desert Tortoise Center will be the number of plants of each type specified.

1.42.2 Payment

The accepted quantities of plants measured will be paid at the contract unit price bid for the type, identified in each bid item. Such payment shall be full compensation for all the labor, materials, coordination with BLM, and incidentals necessary to complete the work.

1.43 SALVAGE, TRANSPORT, AND PLANT PLANTS AT RED ROCK OUTLET CHANNEL (Bid Items 0085 - 0089)

1.43.1 Measurement

Measurement for salvaging, transporting, and planting plants at Red Rock Outlet Channel will be the number of plants of each type specified.

1.43.2 Payment

The accepted quantities of plants measured will be paid at the contract unit price bid for the type, identified in each bid item. Such payment shall be full compensation for all the labor, materials, and incidentals necessary to complete the work.

1.44 PROVIDE BROWSE PROTECTION (Bid Items 0090 and 0097)

Payment for providing browse protection will be made at the applicable contract price for each browse control device placed at the specified sites.

1.45 LARGE BENCH SLOPE TREATMENT (Bid Item 0091)

1.45.1 Measurement

Measurement for Large Bench Slope Treatment will be made on the basis of the actual area in hectares treated as indicated or directed.

1.45.2 Payment

Payment for Large Bench Slope Treatment will be at the applicable contract price, which payment shall constitute full compensation for equipment and labor.

1.46 PLACE TOPSOIL TO FINISHED GRADE (Bid Item 0092)

1.46.1 Measurement

Measurement for Place Topsoil to Finished Grade will be made on the basis

of the cubic meters of material placed and graded to a depth of 200 millimeters over surfaces designated for revegetation treatment. Excess material from strip and stockpile for topsoil that is wasted or placed as miscellaneous fill will not be included for measurement under this item.

1.46.2 Payment

Payment for Place Topsoil to Finished Grade will be at the applicable contract price, which payment shall constitute full compensation for materials, equipment, and labor.

1.47 SEEDING AND FERTILIZATION (Bid Item 0093)

1.47.1 Measurement

Measurement for Seeding and Fertilization will be the number of hectares completed, applied at the specified rate in the designated areas, measured along the ground slope.

1.47.2 Payment

Payment for Seeding and Fertilization will be at the applicable contract price, which payment shall constitute full compensation for materials, equipment, and labor.

1.48 PROVIDE AND PLACE BOULDER GROUPS (Bid Item 0094)

1.48.1 Measurement

Measurement for providing and placing boulder groups will be the number of groups placed, with three boulders per group.

1.48.2 Payment

The accepted quantities of boulder groups placed will be paid at the contract unit price bid. Such payment shall be full compensation for all the labor, materials and incidentals necessary to complete the work.

1.49 PROVIDE PLANT STORAGE IRRIGATION DURING CONSTRUCTION (BID ITEM 0O95)

Payment for providing plant storage area irrigation during construction will be made at the applicable contract price, which payment shall constitute full compensation for furnishing water to maintain plants as specified.

1.50 PROVIDE IRRIGATION FOR ONE YEAR AFTER CONSTRUCTION (BID ITEM 0096)

Payment for providing irrigation for one year after construction will be made at the applicable contract price, which payment shall constitute full compensation for furnishing water to maintain plants placed for revegetation as specified.

1.51 SIMULATED DESERT VARNISH ROCK COLOR MITIGATION (Bid Item 0098)

1.51.1 Measurement

Measurement of Simulated Desert Varnish Rock Color Mitigation will be made

on the basis of the actual area in hectares of exposed excavation and fill surfaces in the construction areas

1.51.2 Payment

Payment for Simulated Desert Varnish Rock Color Mitigation will be at the applicable contract price, which payment shall constitute full compensation for the simulated desert varnish rock color mitigation including furnishing materials, processing, hauling, and placing, complete in place.

1.52 CONCRETE CHANNEL STAIN/SEALER (Bid Item 0099)

1.52.1 Measurement

Measurement of Concrete Channel Stain/Sealer will be made on the basis of the actual area in square meters of channel walls treated as specified or directed.

1.52.2 Payment

Payment for Concrete Channel Stain/Sealer will be at the applicable contract price, which payment shall constitute full compensation for the concrete channel stain/sealer including furnishing materials, processing, surface preparation, and placing, complete in place. **Staining of the Concrete Channel walls will be from station 18+50 to station 35+12, inclusive. The staining will cover the entire water side (interior) surfaces of the channel walls, the top surface widths of the channel walls, and 0.5 meters of the channel wall soil side (exterior) surfaces down from the top of the channel walls.**

1.53 SOIL STABILIZER (Bid Item 0100)

1.53.1 Measurement

Measurement of Soil Stabilizer will be made on the basis of the actual area in hectares of areas treated with soil stabilizer used for revegetation as indicated or directed.

1.53.2 Payment

Payment for Soil Stabilizer will be at the applicable contract price, which payment shall constitute full compensation for the Soil Stabilizer including furnishing materials, processing, hauling, and placing, complete in place.

1.54 PREPARE AS-BUILT DRAWINGS (Bid Item 0101)

Measurement and payment for preparation of as-built drawings shall be made according to the contract lump sum unit price to document construction and prepare drawings in electronic and hard copy format.

1.55 TEST SECTIONS (CHANNEL INVERT AND MAINTENANCE ROAD)

1.55.1 CONCRETE FOR TEST SECTIONS (Channel Invert and Maintenance Road) (Bid Item 0102)

1.55.1.1 Measurement of Concrete

Measurement of Concrete will be made on the basis of the actual volume of concrete within the pay lines of the channel invert as indicated on the drawings. Measurement of concrete placed against the sides of any excavation without the use of intervening forms will be made only within the pay lines of the structures. No deductions will be made for rounded or beveled edges or space occupied by metal work, electrical conduits or timber nor for voids or embedded items which are either less than 0.15 cubic meter in volume or one-tenth of square meter in cross section. Concrete placed in items of work other than those specifically mentioned above, and concrete wasted or used for the convenience of the Contractor will not be included in the measurement.

1.55.1.2 Payment for Concrete

Payment for Concrete will be made at the applicable contract prices for the various items of the schedule, which payments shall constitute full compensation for labor, materials (except cement, pozzolan, admixtures, and reinforcement for which other payment is provided), and for all equipment and tools required to complete the concrete work. Embedded items shall be included in cost of the concrete except when other payment is specifically provided. No payment will be made for concrete, as such, which is placed in structures for which payment is made on a lump sum basis.

1.55.2 PORTLAND CEMENT FOR TEST SECTIONS (Channel Invert and Maintenance Road) (Bid Item 0103)

1.55.2.1 Measurement of Portland Cement

Measurement. The quantity of Portland cement to paid for will be the number of kgs (kilograms) of cement used in the concrete paid for on a cubic yard basis unless specifically excepted, wasted or used for the convenience of the Contractor. The quantity to be paid for will be determined by multiplying the approved batch weight of the cement by the number of batches of concrete of the types placed within the pay lines of the structure.

1.55.2.2 Payment of Portland Cement

Payment for Portland Cement will be made at the applicable contract price, which payment shall constitute full compensation for furnishing the Portland cement complete, ready for use in the work.

1.55.3 POZZOLAN FOR TEST SECTIONS (Channel Invert and Maintenance Road) (Bid Item 0104)

1.55.3.1 Measurement of Pozzolan

The quantity of Pozzolan to be paid for will be the number of cubic meters solid volume of pozzolan used in the concrete paid for on a cubic meter basis unless specifically excepted, wasted or used of r the convenience of

the Contractor. The quantity to be paid for will be determined by multiplying the approved batch weight pozzolan in each type of concrete used by the number of batches of concrete of the types placed within the pay lines of the structure and dividing by the product of the average specific gravity of the pozzolan. The average specific gravity shall be the average of the test results for all material accepted during the period covered by the payment.

1.55.3.2 Payment for Pozzolan

Payment for Pozzolan will be made at the applicable contract prices which payment shall constitute full compensation for furnishing the pozzolan, complete, ready for use in the work.

1.55.4 WATER-REDUCING ADMIXTURE FOR TEST SECTIONS (Channel Invert and Maintenance Roads) (Bid Item 0105)

1.55.4.1 Measurement for Water-Reducing Admixture.

Measurement of water-reducing admixture will be made on the basis of the actual volume of concrete containing the admixture within the pay lines of the various items indicated on the drawings.

1.55.4.2 Payment for Water-Reducing Admixture.

Payment for Water-Reducing Admixture will be paid for at the applicable contract price, which payment shall constitute full compensation for furnishing the admixture complete, ready for use in the work.

1.55.5 LITHIUM BASED ADMIXTURE FOR TEST SECTIONS (Channel Invert and Maintenance Road) (Bid Item 0106)

1.55.5.1 Measurement for Lithium Based Admixture.

The quantity of Lithium based admixture to paid for will be the number of liters of admixture used in the concrete paid for on a cubic yard basis unless specifically excepted, wasted or used for the convenience of the Contractor. The quantity to be paid for will be determined by multiplying the approved batch weight of the admixture by the number of batches of concrete of the types placed within the pay lines of the structure.

1.55.5.2 Payment for Lithium Based Admixture.

Payment for Lithium Based Admixture will be made at the applicable contract price, which payment shall constitute full compensation for furnishing the Lithium Based Admixture complete, ready for use in the work.

1.56 ALTERNATE BID ITEMS

1.56.1 Alternative 1 Riprap Upstream Slope Protection

1.56.1.1 Riprap Filter Material (Bid Item 0107)

Measurement of Filter Material for Riprap will be by cubic meters of filter material placed to the lines and grades indicated on the drawings for upstream slope protection.

Payment of Filter Material for Riprap will be made at the applicable contract unit price per cubic meter, which payment shall constitute full compensation for work required in the installation of filter material, furnishing and placing the filter material, complete.

1.56.1.2 Riprap Placement For Upstream Slope Protection (Bid Item 0108)

Measurement for Riprap Placement For Upstream Slope Protection will be by the metric tonne (1,000 kilograms) of riprap placed for upstream slope protection to the lines and grades indicated on the drawings.

Payment for the riprap will be made at the applicable contract unit price per metric tonne, which payment shall constitute full compensation for work required for installation of riprap, furnishing and placing the riprap, complete.

1.56.2 Alternative 2 Roller Compacted Concrete or Soil Cement Upstream Slope Protection

1.56.2.1 Additional Compacted Fill, Dam Embankment (Bid Item 0109)

Additional Compacted Fill, Dam Embankment will be the amount increased by replacing the riprap upstream slope protection alternative with the roller compacted concrete alternative with measurement as specified for Bid Item 0008 Compacted Fill, Dam Embankment.

1.56.2.2 Roller Compacted Concrete or Soil Cement (RCC/SC) Upstream Slope Protection (Bid Item 0110)

RCC/SC Upstream Slope Protection will be the amount placed for upstream slope protection with measurement as specified for Bid Item 0066 Roller Compacted Concrete.

1.56.2.3 Cement For RCC/SC Upstream Slope Protection (Bid Item 0111)

Cement For RCC/SC Slope Protection will be the amount placed for upstream slope protection with measurement as specified for Bid Item 0067 Portland Cement for RCC.

1.56.2.4 Pozzolan For RCC/SC Upstream Slope Protection (Bid Item 0112)

Pozzolan For RCC/SC Upstream Slope Protection will be the amount placed for upstream slope protection with measurement as specified for Bid Item 0068 Pozzolan for RCC.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

-- End of Section --

SECTION 01451

CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(1999c) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(1998a) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause titled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The project manager will be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with quality requirements specified in the contract. The project manager in this context shall mean the individual with the responsibility for the overall management of the project including quality and production.

3.2 QUALITY CONTROL PLAN

The Contractor shall furnish for review by the Government, not later than 10 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used.

The Government will consider an interim plan for the first 30 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.1 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager who shall report to the project manager.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters shall also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01330 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities will be approved by the Contracting Officer.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of

work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 10 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within the onsite work organization who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a construction person with a minimum of 5 years in related work. This CQC System Manager shall be on the site at all times during construction and shall be employed by the prime Contractor. The CQC System Manager shall have no other duties. An alternate for the CQC System Manager shall be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate shall be the same as for the designated CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: civil, structural, materials technician. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

Experience Matrix

	Area	Qualifications
a.	Civil	Graduate Civil Engineer with 2 years experience in the type of work being performed on this project or technician with 5 yrs related experience
b.	Structural	Graduate Structural Engineer with 2 yrs experience or person with 5 yrs related experience
c.	Environmental	Graduate Environmental Engineer with 3 yrs experience
d.	Concrete, Pavements and Soils	Materials Technician with 2 yrs experience for the appropriate area

3.4.4 Additional Requirement

In addition to the above experience and/or education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management For Contractors".

3.4.5 Organizational Changes

The Contractor shall maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, the Contractor shall

revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, shall be made as specified in Section 01330 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals and deliverables are in compliance with the contract requirements.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

a. A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that protion of the work to be accomplished in the field shall be made available by the Contractor at the preparatory inspection. These copies shall be maintained in the field and available for use by Government personnel until final acceptance of the work.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be

performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least 48 hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, shall be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility shall be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329 **and must be COE certified**.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of **$675.00** to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials shall be borne by the Contractor. Unless specified otherwise, samples of materials for test verification and acceptance testing by the Government shall be delivered to a Quality Assurance Laboratory, at an address to be determined.

Coordination for each specific test, exact delivery location, and dates will be made through the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the end of the work, or any increment of the work established by a time stated in the Special Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications, the CQC Manager shall conduct an inspection of the work. A punch list of items which do not conform to the approved drawings and specifications shall be prepared and included in the CQC documentation, as required by paragraph DOCUMENTATION. The list of deficiencies shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the Contractor shall notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Any items noted on the Pre-Final inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative shall be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice shall be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and shall include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase shall be identified (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within 12 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.10 SAMPLE FORMS

Sample forms enclosed at the end of this section.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

3.12 CONTRACTOR PROJECT MANAGEMENT SYSTEM

3.12.1 General

The Contractor project Management System is included to assure adequate planning and execution of the work, to assist the Contracting Officer on appraising the reasonableness of the schedule, to evaluate progress of the work, and make progress payments, and to make decisions relative to time and/or cost adjustments which may result from changes in the work.

The management system is to be based on a computerized Network Analysis (Critical Path Method) operated by on-site personnel at terminals located in the Contractors's on-site office. On-site management shall be capable of using the system to address all project activities and resources on a real time inactive basis and be capable of rapidly evaluating alternative scenarios which will optimize project management. Evidence of technical expertise of on-site personnel with the proposed computerized Network Analysis System shall be submitted for Contracting Officer's approval prior to on-site work. The Contractor's Scheduling system shall be capable of downloading fully and completely to the Corps of Engineers Standard Data Exchange Format.

The Contractor shall resource load all work activities. As a minimum, resource loading shall identify equipment, management, skilled and

unskilled labor requirements. The Contractor may at his option decide on greater detail for his own purposes, but if this option is elected, the system must be able to consolidate resources into the above defined categories for use by the Contracting Officer.

The Contractor shall incorporate any and all milestone and contract required events which may be specified elsewhere within these specifications. Should milestone events be not specifically identified by the Government within these specifications, the Contractor shall identify at least five percent of the network activities and designate them as milestone activities.

The Contractor Project Management System is to be staffed and prepared pursuant of CONTRACT CLAUSE: SCHEDULE FOR CONSTRUCTION CONTRACTS, and CONTRACT CLAUSE: SUPERINTENDENT BY THE CONTRACTOR. In preparing this system the Contractor assume responsibility for conformance with contract requirements, planning, sequencing of work, and determining the construction means and methods.

3.13.1 Submission and Approval.

Submission and approval of the system shall be as follows:

The complete network system consisting of the detailed network mathematical analysis (including on-site manpower loading schedule) and network logic diagrams shall be submitted for approval within thirty (30) calendar days after receipt of Notice to Proceed. This shall be submitted in assembled hardcopy paper format and software computer disk to allow restoring on Government Computers.

The Contractor shall participate in a review and evaluation of the proposed network logic diagrams and mathematical analysis by the Contracting Officer. Any revisions necessary as a result of this review shall be resubmitted for approval of the Contracting Officer within three (3) calendar days after the conference. The approved schedule shall be used by the Contractor for planning, organizing and directing the work, reporting progress, and requesting payment for work accomplished.

3.14.1 Network Modifications.

In those cases where the contract performance is delayed due to causes beyond the control of the Contractor, and a time extension may be allowable under one or more of the CONTRACT CLAUSES: CHANGES, or DIFFERING SITE CONDITIONS, or DEFAULT (FIXED PRICE CONSTRUCTION), or SUSPENSION OF WORK, or other applicable clauses, as a proposal in such format as to identify the specific subnet diagram and activities affected.

Change order proposals shall include description or listing of all proposed changes to the network, by activity, and demonstrate the effect on the contract required completion date. A complete list of activities changed and subnet of activities affected by the change shall be submitted.

Float or slack is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the NAS schedule. Float or slack is not time for the exclusive use or benefit of either the Government or the Contractor. Extensions of time for performance may be granted to the extent that equitable time adjustment for the activities affected exceed

the total float or where otherwise justified effect on contract completion can be shown. The contract completion date is fixed, and will be amended only for modifications which include time and are signed by the Contracting Officer.

Rapid resolution of change orders and the granting of other time extensions where authorized by the Contracting Officer is a critical part of the overall management system. Implementation of all justified activity and logic changes shall be made and reflected on the next monthly update after approval of the Contracting Officer.

If, in the opinion of the Contracting Officer, the current schedule no longer accurately reflects the Contractor's real plan for accomplishing the work, or no longer reflects a viable way of finishing the work on schedule, the Contractor shall be directed to revise the schedule and submit it for approval within seven (7) calendar days of direction.

3.15.1 Logic Diagrams and Reports.

3.15.1.1 Logic diagrams.

Logic diagrams shall show the order and interdependency of activities and sequence in which the work is to be accomplished as planned by the Contractor.

Detailed networks need not be timed scaled, but drafted to have a continuous flow from left to right, showing how the start of a given activity is dependent on the completion of preceding activities, and how its completion restricts the start of the following activities.

An assembled logic diagram of the complete project shall be submitted with the initial NAS, showing each activity identifying numbers, duration, description, with the critical path easily identified. Updated assembled diagrams will be provided as required by logic changes (but not more frequently than the monthly update). The logic diagram shall be plotted on architectural size E paper.

3.15.1.2 Reports.

After the network approval, the Contractor shall review and evaluate the actual progress with the Contracting Officer's representative on a weekly basis, and submit any updated weekly reports three (3) workdays after the meeting.

Weekly reports must be flexible in format, allowing generation of reports relating specifically to critical work areas, or areas of particular interest. The Government will identify the subject of the requested reports for the following week at a weekly review meeting.

Monthly update reports will be submitted at midmonth showing status and actual start and finish dates of project activities, and will be capable of comparing the current status with the approved base schedule. Each monthly update report shall be uniquely identified and shall be stored on the Contractor's computer until the final pay estimate is processed. The content of the monthly update shall be flexible to show items listed in the menu. The midmonth report shall be used for partial payments.

A meeting shall be held three (3) workdays before the delivery of the midmonth report to discuss all input data. If the Contractor desires to make changes in his method of operation and scheduling, he shall clearly present the proposed changes.

A narrative report shall be submitted with midmonth report indicating current and anticipated problems, delaying factors, and conditions that are impacting the Contractor's work effort. An analysis showing the reasons for the delay/gain and their impact upon the current schedule shall be included. If it becomes apparent the scheduled milestone(s) and completion date(s) will not be met, the Contractor shall propose specific methods he intends to implement to bring the project back on schedule at no cost to the Government. Such measures may include but are not limited to:

a. Increasing construction manpower in such quantities and crafts as will substantially eliminate the backlog of work effort.

b. Increasing the number of working hours per shift; shifts per workday; workdays per week; the amount of construction equipment; or any combination thereof.

c. Rescheduling of activities to achieve maximum practical concurrence of work shifts.

The Contractor shall implement such procedures as may be necessary for the active participation by his subcontractors in preparing and updating the schedule. Subcontractors shall be provided with schedules which identify the interfaces of their work with the work of others. At minimum, the Contractor shall provide bar graphs to each major subcontractor showing activity times with plots on an Early Start basis. Copies of these schedules shall also be provided to the Contracting Officer. The relationship between subcontractor and interdependency or work shall be managed by the Contractor. When these interdependencies are violated or impaired, the Contractor shall identify the problem, resolve it, and provide the information to the Contracting Officer as part of the monthly report.

3.16.1 Forecasting Expenditures.

The Contracting Officer will provide a spreadsheet to the Contractor showing the different funding categories and their respective categories for each bid item for the total contract amount (see attached FIGURE 1). Each pay period the contractor shall forecast his expenditures for the following 3 pay periods, indicating funding requirements for each category. The updated worksheet (see attached FIGURE 2) shall be submitted with each partial pay estimate (e.g. submittal for the period 15 Dec to 15 Jan will include a forecast of expenditures for the period 15 Jan to 15 Apr). Forecasting of expenditures is needed to assure sufficient funding for future progress payments.

3.17.1 Payment Requests.

The monthly update report shall be used as a basis for the monthly partial pay estimate. The report will state the cost, actual percent complete, and current value of partially completed or completed work. Subtotals representing separate areas of construction will be given, along with a grand dollar value of work completed for the project.

The first payment shall not be made until the Network Analysis Schedule has been approved by the Contracting Officer. If, in the judgment of the Contracting Officer, The Contractor fails or refuses to provide an approved schedule and other progress or input data specified, the Contractor shall be deemed not to have provided the required information upon which progress payments may be made, and no payment request will be honored.

Activities submitted for payment shall be based on the approved network activities and monetary amount. No payment shall be made for activities conducted in deviation of the approved logic.

Payment for activities conducted when previously dependent activities have not been completed or accepted due to quality defects shall be restricted at the discretion of the Contracting Officer.

3.18 IMPLEMENTATION OF GOVERNMENT RESIDENT MANAGEMENT SYSTEM

The Contractor shall utilize a Government furnished CQC Programming Module (A computerized executable file which is DOS based and operates on a minimum of 80386 IBM compatible computers). The Module includes a Daily CQC Reporting System Form which must also be used. This form may be in addition to other Contractor desired reporting forms. However, all other such reporting forms shall be consolidated into this one Government specified Daily CQC Report Form. The Contractor will also be required to complete Government-furnished Module elements which include, but are not limited to, Prime Contractor staffing; letter codes; planned cumulative progress earnings; subcontractor information showing trade, name, address, point-of-contact, and insurance expiration dates; definable features of work; pay activity and activity information; required Quality Control tests tied to individual activities; planned User Schooling tied to specific specification paragraphs and contractor activities; Installed Property Listing, Transfer Property Listing and submittal information relating to specification section, description, activity number, review period and expected procurement period. The sum of all activity values shall equal the contract amount, and all Bid Items, Options and Additives shall be separately identified, in accordance with the "Bidding Schedule". Bid Items may include multiple Activities, but Activities may only be assigned to one such Bid Item. This Module shall be completed to the satisfaction of the Contracting Officer prior to any contract payment (except for Bonds, Insurance and/or Mobilization, as approved by the Contraction Officer) and shall be updated as required.

During the course of the contract, the Contractor will receive various Quality Assurance comments from the Government that will reflect corrections needed to Contractor activities or reflect outstanding or future items needing the attention of the Contractor. The Contractor will acknowledge receipt of these comments by specific number reference on his Daily CQC Report and will also reflect on his Daily CQC Report when these items are specifically completed or corrected to permit Government verification.

3.19 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the worksite, shall be deemed sufficient for the purpose of notification. If the Contractor fails or

refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

-- End of Section --

FIGURE 1
SAMPLE SPREADSHEET

SEVEN OAKS DAM, DAM AND APPURTENANCES
SAN BERNARDINO COUNTY, CALIFORNIA

ITEM #	DESCRIPTION	TOTALS AMOUNT	%	FED BE069	%	O.C. NON-FED FW090	%
1.	MOB & DEMOB	$1,000,000.00	94,1797	$941,797.00	5.1044	$51,044.00	0.4092
2.	DIV & CONTROL WA	$2,000,000.00	94,1797	$1,883,594.00	5.1044	$102,088.00	0.4092
3.	CLEAR SITE	$1,000,000.00	94,1797	$941,797.00	5.1044	$51,044.00	0.4092
4.	SCALING	$2,000,000.00	94,1797	$1,883,594.00	5.1044	$102,088.00	0.4092
5.	EXC, FOUND ALLU	$5,000,000.00	94,1797	$4,708,985.00	5.1044	$255,220.00	0.4092
6.	EXC, FOUND ROCK	$5,000,000.00	94,1797	$4,708,985.00	5.1044	$255,220.00	0.4092
					%	NON-FED VW090	%
7.	PROTECT-IN-PLACE	$1,000,000.00			87.6999	$876,999.00	7.0306
8.	RELOCATE NEWPO	$2,000,000.00			87.6999	$1,753,998.00	7.0306

FIGURE 2
SAMPLE WORKSHEET

SEVEN OAKS DAM, DAM AND APPURTENANCES
SAN BERNARDINO COUNTY, CALIFORNIA

EXPENDITURES FORECAST

	JAN 15 - FEB 15	FEB 15 - MAR 15	MAR 15 - APR 15
BE069	$5,660,000.00	$7,540,000.00	$9,420,000.00
FW090	$310,000.00	$410,000.00	$520,000.00
FW093	$30,000.00	$40,000.00	$50,000.00
FW092	$20,000.00	$30,000.00	$40,000.00
VW090	$62,000.00	$53,000.00	$44,000.00
VW093	$5,000.00	$5,000.00	$4,000.00
VW092	$4,000.00	$4,000.00	$3,000.00

SECTION 02250

FILLS AND SUBGRADE PREPARATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 422	(1963; R 1998) Particle-Size Analysis of Soils
ASTM D 1556	(1990; R 1996el) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991; R 1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2216	(1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 4832	(1995el) Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders

1.2 COMPACTION EQUIPMENT

Compaction shall be accomplished by tamping roller, rubber tired roller vibratory compactor or mechanical tampers. All equipment, tools, and machines shall be maintained in satisfactory working condition at all times. Compaction equipment shall be suitable for consistently producing uniform soil densities.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-09 Reports

Field Density Tests; GA.
Testing of Compacted Fill Materials; GA.

Copies of all laboratory and field test reports within 24 hours of the completion of the tests.

1.4 GENERAL REQUIREMENTS FOR COMPACTED FILLS AND COMPACTED BACKFILLS

1.4.1 Control

Moisture-density relations shall be established by the Contractor. The soil used for each maximum density test shall be classified in accordance with ASTM D 2487 and shall include a particle size analysis in accordance with ASTM D 422. At least one five point maximum density test shall be made for every 10 field density tests. Field density tests shall be performed by the Contractor at the frequency established in paragraph: Field Control, and in such locations to insure that the specified density is being obtained. Moisture-density relations and field densities shall be reported on approved forms. One copy of density data less dry weight determinations shall be provided on the day each test is taken. The completed test reports shall be provided with the Contractor Quality Control Report on the work day following the test.

1.4.1.1 Laboratory Control

Moisture-density relations shall be established by the Contractor. One moisture-density relation shall be made for each classification, blend or change in classification of soil materials encountered. Approval of moisture-density relations shall be obtained prior to the compacting of any material in the work. The moisture-density relations shall be determined in a laboratory in accordance with ASTM D 1557.

a. The desired amount of mixing water will be added for each compaction test specimen, mixed well, and the mixture will be placed in a container with an airtight cover and allowed to cure for 24 hours. A shorter curing time may be allowed where tests show that shortening the curing time will not affect the results.

1.4.1.2 Field Control

Field in-place density shall be determined in accordance with ASTM D 1556. The field moisture content shall be determined in accordance with ASTM D 2216. Determination of in-place densities using the nuclear method (ASTM D 2922) may be used to supplement the sand cone density tests (ASTM D 1556). When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. At least one adjacent sand cone test shall be performed for every five nuclear density tests performed. If field density tests determined by the nuclear method vary by more than 0.5 kilonewtons per cubic meter from comparison sand-cone tests, and are consistently high or low, adjustment of the calibration curve is necessary.

a. In-Place Densities

(1) One test per 750 cubic meters, for the first 7,500 cubic

meters of material and one test for each 1,500 cubic meters thereafter, or fraction thereof, shall be made of each lift of fill or backfill areas compacted by other than hand-operated machines. At least one test shall be made in each 0.6 meter layer of compacted fill or backfill processed as a unit and not less than one test shall be made in each area.

(2) One test per 400 cubic meters, or fraction thereof, shall be made of each lift of fill or backfill areas compacted by hand-operated machines. The Contractor CQC shall maintain a log of all tests which will updated and submitted to the Contracting Officer on a weekly basis. The test log shall include: Test number (if retest shall include retest number), date, feature of work, station and offset, weight of wet soil, weight of dry soil, percent of compaction, optimum moisture content, maximum dry unit weight, soil classification, in-place density test methods either sand-cone or nuclear densimeter.

1.4.2 Settling of Fills or Backfills With Water

Settling of fills or backfills with water will not be permitted.

1.4.3 Fill Material

Fill material shall be obtained from the required excavation. Materials considered unsatisfactory for use as compacted fill include but are not limited to those materials containing roots and other organic matter, trash, debris, chunks or clumps of cemented material, and shall contain no stone whose greatest dimension is more than 3/4 the lift thickness. The Contractor shall expect to break-down, crush or otherwise process required excavation for use as fill material due to the cementation of in-situ soils. Materials classified in ASTM D 2487 as MH, CH, Pt, OH, and OL are also considered unsatisfactory for use as compacted fill. The fill material shall have sufficient amount of fine material to fill the voids between coarser aggregate and shall conform to the following requirements:

Sieve Size (Millimeters)	Percent by Weight Passing
150	100
75	80 - 100
4.75	70 - 35

Material for compacted fill behind concrete structures shall contain less than 30 percent by weight passing the 4.75 millimeter (No. 200) sieve and shall contain **stone smaller** than 75 mm.

1.4.4 Placement

Fill material shall not be placed against concrete which has not been in place at least 14 days or until the concrete has attained a strength of 17.2 megapascals when tested in accordance with the Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS. Placement over pipes and buried structures shall be in accordance with Section 02630 STORM DRAINAGE SYSTEM except placement over outlet conduit shall be in accordance with compacted fill, dam embankment. Compacted fill shall be placed with

suitable equipment in horizontal layers which before compaction, shall not exceed 0.3 meters in depth for rubber-tired or vibratory rollers, 0.2 meters in depth for tamping rollers, and 0.1 meters in depth when mechanical tampers are used. The Contractor may vary the layer thickness within these limits for most efficient operations. Material containing stones shall be placed in a manner to prevent the stones from striking the concrete structures and to prevent the formation of voids.

1.4.5 Moisture Content

Material shall have a uniform moisture content while being placed and compacted. Water shall be added at the source, if required, or by sprinkling each layer of material during placement. Uniform distribution of moisture shall be obtained by disking, harrowing, or otherwise manipulating the soil during and after time water is added. Material containing an excess of moisture shall be manipulated with suitable implements to facilitate maximum aeration and shall be permitted to dry to the proper consistency before being compacted. Fill shall have a maximum moisture content of not more than 2 percent above optimum and a minimum moisture content of not less than 2 percent below optimum.

1.4.6 Compaction

No layer of fill shall be compacted before the practicable uniform moisture content has been obtained. Scarified areas shall be compacted as specified for the fill placed thereon. Rollers will not be permitted to operate within 0.3 meters of structure walls or over buried structures until the compacted fill over the top of the structures has reached a depth of 0.6 meters. Compaction equipment shall be so operated that structures are not damaged nor overstressed during compaction operations. Mechanical tampers shall be used for compaction of fill material adjacent to structures where rolling equipment is impracticable for use in compaction.

1.5 COMPACTED FILL

1.5.1 Dam Embankment

1.5.1.1 Foundation Preparation

Before placing material for compacted fill, the foundation surface shall be cleared of all existing obstructions, vegetation, debris, and stripped of surface soils in accordance with Section 02910 NATIVE PLANT EXTRACTION, SALVAGE AND STORAGE, Section 02150 CLEAR SITE AND REMOVE OBSTRUCTIONS, and Section 02200 EXCAVATION. Within the dam embankment footprint, excluding miscellaneous fill zone, the following shall be removed: (1) the upper 1.5 meters of foundation soil within an inspection trench, 4 meters wide, along the centerline of the embankment (2) the upper 1.5 meters of foundation soil in designated wash areas, (3) the upper 0.610 meters of foundation soil within the footprint of the dam embankment outside of the inspection trench and designated wash areas (4) material shall be removed in accordance with SECTION 02150 CLEAR SITE AND REMOVE OBSTRUCTIONS and SECTION 02200 EXCAVATION. The inspection trench and the banks of the existing washes shall be excavated as shown on the plans and in accordance with SECTION 02200 EXCAVATION. Depths may be reduced if hard cemented materials or bed rock is encountered subject to the approval of the Contracting Officer. Unsatisfactory materials not meeting the requirements for fill material shall be removed where directed. The existing surfaces, including the excavated inspection trench and banks and the areas beneath

the outlet structure and conduit within the footprint of the dam embankment, shall be scarified to a depth of 150 millimeters and proofrolled by four passes of the compaction equipment before placing the fill. Sloped ground surfaces steeper than one vertical to four horizontal, on which fill or compacted backfill is to be placed, shall be stepped in such a manner that the compaction equipment will bear on the full depth of the layer. All rock surfaces upon which or against which embankment materials are to be placed shall be broom cleaned. Prior to the placement of embankment material upon or against a rock surface, all open joints and cracks greater than 13 mm in thickness shall be filled with mortar to the depths cleaned. Those portions of such rock surfaces where there are holes greater than 100 mm deep and smaller than 610 mm across shall be filled with mortar or concrete. Rough areas that, in the opinion of the Contracting Officer, the compaction of the embankment materials cannot be accomplished satisfactorily with power tampers or other specified compaction equipment shall be filled with mortar or concrete, as directed to the extent necessary, to merit satisfactory use of the compaction equipment. In no case shall a thin coat of mortar be left on smooth, intact rock surfaces. Large rock overhangs and protrusions shall be removed by the use of pre-splitting or line drilling techniques in such a manner as to minimize damage to the underlying rock, or the spaces beneath overhangs and around protrusions shall be filled with tamped concrete so that satisfactory compaction of embankment materials can be accomplished. Vertical surfaces shall not be more than 1.5 meters in height, and benches of sufficient width shall be provided as necessary so that the average slope of any rock face is not steeper than 1 vertical on 4 horizontal. Mortar and concrete, including forming as necessary, shall conform with the applicable provisions of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS.

1.5.1.2 Placement and Compaction

Each layer of the material shall be compacted to not less than 95 percent of maximum density, per ASTM D 1557. The Contractor shall construct dam embankment by placing successive horizontal lifts over the entire plane of the work surface. All fill materials shall be placed parallel to axis of dam in compacted horizontal lifts less than 300 mm thickness. Placement of adjacent fills at different heights is prohibited. Where interim slopes are allowed by the Contracting Officer, the Contractor shall grade slopes flatter than 3H:1V. The Contractor must bench and moisture condition interim slopes immediately prior to placement of each lift of new fill against interim slopes. Whenever a compacted surface of any lift has been made too smooth to bond to successive layer by concentration of hauling equipment or other reasons, the Contractor shall loosen by scarifying or other equivalent methods and moisture condition surface prior to placement of the succeeding lift. The embankment lift surfaces shall be kept moist. If a lift surface dries out and cracks, the Contractor shall moisture condition to specified range and rework the lift prior to placement of the subsequent lift. Finished surfaces shall be overbuilt and cut to final grade.

1.5.1.3 Settlement

The Contractor shall delay RCC placement for a maximum settlement period of 60 days after embankment in that area reaches full height in order to monitor anticipated settlement of the embankment. The Contractor shall install two surface settlement monuments at STA 14+00, and STA 15+50; the location with respect to the dam centerline will be determined by the

Contracting Officer.

1.5.1.4 Settlement Monitoring

The monuments shall be surveyed by the Contractor within 24 hours of installation and the elevation surveyed on a weekly basis. The survey data shall be provided to the Contracting Officer for review to determine the need for further monitoring. If the survey data indicates there is inconsequential settlement, the Contracting Officer may approve RCC placement before the 60 day settlement period expires. A settlement monument plan including typical details of the surface settlement monuments along with the plan to protect the monument during construction shall be provided by the Contractor for review not less than 14 calendar days prior to installation of the monument.

1.5.1.5 Settlement Monument Protection Plan

The location of the settlement monument shall be clearly marked and readily visible (red flagged) to equipment operators. In the event of damage to settlement monument or extension resulting from equipment operating within the specified area, the Contractor shall immediately notify the Contracting Officer and shall be responsible for restoring the settlement monument to working order.

1.5.1.6 Regrading of Embankment Crest

If the dam embankment crest settles, the embankment shall be regraded to the lines and grades indicated after the settlement period is completed.

1.5.2 Basin

1.5.2.1 Location

Compacted fill for the basin shall consist of small amount of fill associated with the detention basin grading and access roads to be placed outside of the dam embankment footprint. This quantity shall not be measured for payment but shall be considered incidental to basin excavation.

1.5.2.2 Preparation for Placing

The foundation for the compacted fill to be placed in the basin shall be cleared of all existing obstructions, vegetation and debris. Vegetation shall be salvaged in accordance with Section 02910 NATIVE PLANT EXTRACTION, SALVAGE AND STORAGE. Any trash or debris shall be removed in accordance with SECTION 02150 CLEAR SITE AND REMOVE OBSTRUCTIONS and SECTION 02200 EXCAVATION. Unsuitable materials or unstable (too wet) not meeting the requirements for fill material shall be removed where directed. The existing surfaces for compacted fill in the basin shall be scarified to a depth of 0.15 meters and proofrolled by four passes of the compaction equipment.

1.5.2.3 Compaction

Each layer of the material shall be compacted to not less than 90 percent of maximum density, per ASTM D 1557.

1.5.3 Compacted Fill, Channel

1.5.3.1 Compaction

Compacted fill includes fill under and adjacent to the channel and under the maintenance road more than 300 mm beneath the road base course. Each layer of the material shall be compacted to not less than 90 percent of maximum density, per ASTM D 1557.

1.5.3.2 Behind Channel Walls

Limitations on Equipment

The gross weight of any piece of equipment, or the combined weight of any combinations of equipment coupled together, used to place moisten, and/or compact fill behind channel walls and up to 0.6 meters above the top of conduit shall not exceed 16,000 kilograms, including dynamic forces produced by vibratory equipment. Equipment used to compact the fill behind channel walls shall be of such size as to be capable of operating in the area between the cut slope and the channel wall.

Construction Balance

Fills behind walls on one side of the channel shall not exceed by more than 1.5 meters the height of the fill behind the opposite channel wall at any time during construction.

1.5.3.3 Trimming

The top of fill adjacent to channel walls shall be trimmed to the lines indicated on the drawings with a tolerance of plus or minus 25 millimeters. Any material loosened by trimming shall be recompacted and the area moistened and compacted with one pass of a smooth-wheeled roller. Tolerances shall apply after rolling. Fill slopes shall be trimmed to a uniform alinement at top of berm and reasonably uniform slope at or outside the lines shown on drawings.

1.5.4 Compacted Fill, Road

1.5.4.1 Location

Compacted fill, road shall consist of fill placed for the channel maintenance road, in the upper 300 millimeters beneath the road.

1.5.4.2 Compaction

Fill shall be compacted to not less than 95 percent of maximum density per ASTM D 1557.

1.5.5 Filter Material

1.5.5.1 Preparation for Placing

The foundation for the filter material shall be cleared of all existing obstructions, vegetation and debris. Any trash or debris shall be removed in accordance with SECTION 02150 CLEAR SITE AND REMOVE OBSTRUCTIONS and SECTION 02200 EXCAVATION. Unsatisfactory materials not meeting the requirements for fill material shall be removed where directed. The existing surfaces for compacted fill in the basin shall be scarified to a

depth of 0.15 meters and proofrolled by four passes of the compaction equipment. The subgrade for filter material shall be prepared in accordance with paragraph: SUBGRADE PREPARATION.

1.5.5.2 Material

Filter material shall be obtained by commercial sources or processed materials from basin excavation. Filter material gradation shall be within the limits specified in SECTION 02710 SUBDRAINAGE SYSTEMS.

1.5.5.3 Placement and Compaction

Filter materials shall be spread by motor graders or other approved means in approximately horizontal layers to the lines and grades indicated on the plans. The thickness of the layers before compaction shall not be more than 0.3 meters. The entire surface of the layer shall be compacted by not less than four complete passes of the 9-ton vibratory roller. Each trip of the roller shall overlap the adjacent trip not less than 0.3 meters. The finished surface of the filter material shall not vary more than 12.5 millimeters above or below the indicated grades.

1.5.6 Drain Material

1.5.6.1 Material

Drain material shall be obtained by commercial sources or processed materials from basin excavation. Drain material gradation shall be within the limits specified in SECTION 02710 SUBDRAINAGE SYSTEMS.

1.5.6.2 Placement and Compaction

Drain materials shall be spread over filter material by motor graders or other approved means in approximately horizontal layers to the lines and grades indicated on the plans. The thickness of the layers before compaction shall not be more than 0.3 meters. The entire surface of the layer shall be compacted by not less than four complete passes of the 9-ton vibratory roller. Each trip of the roller shall overlap the adjacent trip not less than 0.3 meters. Mechanical tampers shall be used for compaction of drain materials over and adjacent to the drainage conduits. The finished surface of the filter material shall not vary more than 12.5 millimeters above or below the indicated grades.

1.6 BACKFILL

1.6.1 Backfill About Structures

1.6.1.1 Location

Backfill shall consist of all fill against and/or around structures, except backfill for conduits and compacted fill, channel.

1.6.1.2 Material

Backfill material shall be obtained from the required excavation as approved by the Contracting Officer. In general, the best material available will be designated as backfill and fill about structures. Backfill may consist of sand, gravelly sand, and silty sands. Organic

material, silt, clay, broken concrete or pavement, boulders and other unsatisfactory material shall not be used. Backfill for structures shall not contain any stones larger than 76 millimeters.

1.6.1.3 Placing

Backfill material shall not be placed against concrete which has not been in place at least 14 days or until the concrete has attained a strength of 17.2 megapascals when tested in accordance with Section 03301 CAST-IN PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS. Backfill shall be placed in 100 millimeter layers.

1.6.1.4 Compaction

Compaction shall be not less than 95 percent of maximum density, per ASTM D 1557.

1.6.2 Slurry Backfill

1.6.2.1 Material

Slurry cement backfill shall be a Controlled Low Strength Material (CLSM), shall consist of a low-strength, self-leveling concrete material composed of various combinations of cement, fly ash, aggregate, water, and chemical admixtures. It shall have a design compressive strength at an age of 28 days 2 MPa. Compressive strength testing shall be performed in accordance with ASTM D 4832. The mix shall result in a product having a slump in the range of 6 to 10 inches at the time of placement. The Contractor shall submit a mix design for approval by the Contracting Officer prior to placement. The mix design shall be supported by laboratory test data verifying the potential of the mix to comply with the requirements of these specifications. Cement, fly ash, aggregate, water, and chemical admixtures, shall be as specified in Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS.

1.6.2.2 Placing

Slurry cement backfill should be placed directly into the space to be filled. It may be placed to partial depth or full depth as conditions at the site dictate. When used as backfill in the pipe zone, care should be taken to prevent floatation or misalignment of the pipe by means of straps, soil anchors, or other approved means of restraint. Material may be placed in stages to prevent movement or floatation of pipe.

1.7 MISCELLANEOUS FILL

Miscellaneous fill shall consist of material from the required excavation, including surface soil from stripping that is in excess of topsoil material needed for areas of revegetation treatments. Miscellaneous fill shall be placed in the lines and grades indicated on the drawings and shall be placed with suitable equipment in successive horizontal layers over the entire plane of the work surface and which shall not exceed 600 millimeters in depth before consolidation. Broken concrete, rock, cemented alluvium, and asphalt to be wasted may be buried in the miscellaneous fill provided such material does not exceed 600 millimeters in its greatest dimension, is placed in a manner that will prevent the formation of voids, and is placed not less than 600 millimeters below finished grade (including finished

grade of side slopes). No depressions in which water might pond shall be left in miscellaneous fill area. The finished areas shall be sloped to drain. Compaction other than that obtained by the controlled movement of the construction equipment will not be required.

1.8 TOPSOIL

Topsoil shall consist of material stripped from the surface of excavation areas stockpiled for placement on the downstream side of the embankment in designated revegetation treatment areas. Topsoil shall be placed with a minimum thickness of 200 millimeters. Topsoil shall be processed with soil amendments for Section 02930 EXTERIOR PLANTING. Compaction other than that required by the controlled movement of the construction equipment will not be required.

1.9 SUBGRADE PREPARATION

Subgrade preparation shall include subgrade preparation for the outlet structure and conduit, for the channel, and areas to receive aggregate base course.

All trash and debris shall be removed in accordance with Section 02150 CLEAR SITE AND REMOVE OBSTRUCTIONS and Section 02200 EXCAVATION. After excavation to rough grade, the entire subgrade for the channel slopes, invert, invert access ramp, and other areas indicated above shall be moisture conditioned and proofrolled by 4 passes of the compaction equipment and trimmed to a uniform grade. Subgrade to receive concrete shall be smoothed with a steel-wheeled roller. If the subgrade is disturbed by the Contractor's operations or is overexcavated, or is soft or yielding, the subgrade shall be restored to grade and compacted to a density of 95 percent of maximum density, per ASTM D 1557. The finished surface of the subgrade shall not be more than 12.5 millimeters above the indicated grade at any point when tested with a 3 meter straightedge.

1.10 SOIL STABILIZER

Soil stabilizer shall be placed on exposed excavated surfaces and fill not including areas of revegetation or placed riprap or roller compacted concrete after construction is completed. The soil stabilizer shall be a mixture of plaster and natural cellulose fiber mulch. The cellulose fiber mulch shall be produced from grinding clean, whole wood chips, or fiber produced from ground newsprint with a labelled ash content not to exceed 7 percent. The plaster shall consist of naturally occurring high purity processed gypsum and additives. The gypsum shall be produced from a mined or quarried source. The gypsum shall be processed to be composed of a crushed, dry calcium sulfate hemihydrate having a purity of not less than 88 percent. The gypsum and additives shall be furnished either in bags or bulk and be accompanied by bills of lading and shipping invoices. The shipping invoices for the gypsum shall state the gypsum's purity content, dry weight, and source of manufacture. Processed gypsum which has become partially air set, lumpy or caked shall not be used. The plaster/cellulose fiber mulch shall be applied at a rate of 6.725 tonnes of plaster mixed with 2.242 tonnes of fiber per hectare. The plaster/cellulose fiber mulch shall have an added color pigment applied to approximate the existing ground surface color. The plaster/cellulose fiber mulch stabilizer shall formulate a protective crust-like barrier within 4 to 8 hours after application. Application of the plaster/cellulose fiber mulch stabilizer shall not be permitted when weather conditions are unsuitable for concrete

placement in accordance with Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS.

1.11 Disposal Site

Natural drainage courses through disposal sites shall be maintained.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

-- End of Section --

SECTION 02316

EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1556	(1990; R 1996el) Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D 1557	(1991; R 1998) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2487	(1998) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	(1996el) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988; R1996el) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.2 DEGREE OF COMPACTION

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-09 Reports

Field Density Tests; GA. Testing of Backfill Materials; GA.

Copies of all laboratory and field test reports within 24 hours of the completion of the test.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Satisfactory Materials

Satisfactory materials shall comprise any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP.

2.1.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills, trash, refuse, or backfills from previous construction. Unsatisfactory material also includes material classified as satisfactory which contains root and other organic matter, frozen material, and stones larger than 76 mm inches. The Contracting Officer shall be notified of any contaminated materials.

2.1.3 Unyielding Material

Unyielding material shall consist of rock and gravelly soils with stones greater than 76 millimeters inches in any dimension or as defined by the pipe manufacturer, whichever is smaller.

2.1.4 Select Granular Material

Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone or crushed slag composed of hard, tough and durable particles, and shall contain not more than 10 percent by weight of material passing a 0.075 mm No. 200 mesh sieve and no less than 95 percent by weight passing the 25 mm l inch sieve. The maximum allowable aggregate size shall be 25 millimeters, inches, or the maximum size recommended by the pipe manufacturer, whichever is smaller.

2.1.5 Initial Backfill Material

Initial backfill shall consist of select granular material or satisfactory materials free from rocks 25 millimeters inches or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller.

PART 3 EXECUTION

3.1 EXCAVATION

Excavation shall be performed to the lines and grades indicated. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench equal to 1/2 the depth of the excavation, but in no instance closer than 600 mm. 2 feet. Excavated material not required or not satisfactory for backfill shall be removed from the site. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating shall be removed to maintain the stability of the bottom and sides of the excavation. Unauthorized overexcavation shall be backfilled in accordance with paragraph BACKFILLING AND COMPACTION at no additional cost to the Government.

3.1.1 Trench Excavation Requirements

The trench shall be excavated as recommended by the manufacturer of the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as recommended in the manufacturer's installation manual. Where no manufacturer's installation manual is available, trench walls shall be made vertical. Trench walls more than 1.5 meters feet high shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. **For the existing Flamingo side drain trench, the existing trench walls that are vertical and deeper than 1.5 meters feet high shall be immediately corrected to 1.5 meters feet maximum.** Trench walls which are cut back shall be excavated to at least the angle of repose of the soil. Special attention shall be given to slopes which may be adversely affected by weather or moisture content. The trench width below the top of pipe shall not exceed 600 mm 24 inches plus pipe outside diameter (O.D.) for pipes of less than 600 mm 24 inches inside diameter and shall not exceed 900 mm 36 inches plus pipe outside diameter for sizes larger than 600 mm 24 inches inside diameter. Where recommended trench widths are exceeded, redesign, stronger pipe, or special installation procedures shall be utilized by the Contractor. The cost of redesign, stronger pipe, or special installation procedures shall be borne by the Contractor without any additional cost to the Government.

3.1.1.1 Bottom Preparation

The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones of 76 millimeters inches or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, shall be removed to avoid point bearing.

3.1.1.2 Removal of Unyielding Material

Where unyielding material is encountered in the bottom of the trench, such material shall be removed 100 millimeters inches below the required grade and replaced with suitable materials as provided in paragraph BACKFILLING AND COMPACTION.

3.1.2 Stockpiles

Stockpiles of satisfactory materials shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment, excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Government. Locations of stockpiles of satisfactory materials shall be subject to prior approval of the Contracting Officer.

3.2 BACKFILLING AND COMPACTION

Backfill material shall consist of satisfactory material, select granular material, or initial backfill material as required. Backfill shall be placed in layers not exceeding 150 mm 6 inches loose thickness for compaction by hand operated machine compactors, and 200 mm 8 inches loose thickness for other than hand operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent maximum density.

3.2.1 Trench Backfill

Trenches shall be backfilled to existing grade.

3.2.1.1 Replacement of Unyielding Material

Unyielding material removed from the bottom of the trench shall be replaced with select granular material or initial backfill material.

3.2.1.2 Bedding and Initial Backfill

Bedding shall be of the type and thickness shown. Initial backfill material shall be placed and compacted with approved tampers to a height of at least 610 mm above the utility pipe or conduit. The backfill shall be brought up evenly on both sides of the pipe for the full length of the pipe. Care shall be taken to ensure thorough compaction of the fill under the haunches of the pipe.

3.2.1.3 Final Backfill

The remainder of the trench shall be filled with satisfactory material. Backfill material shall be placed and compacted to at least 95 percent maximum density. Water flooding or jetting methods of compaction will not be permitted.

3.2.2 Backfill for Appurtenances

After the manhole, catchbasin, inlet, or similar structure has been constructed, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for final backfill, and shall be brought up evenly on all sides of the structure to prevent eccentric loading and excessive stress.

3.3 TESTING

Testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Government.

3.3.1 Testing Facilities

Tests shall be performed by an approved commercial testing laboratory or may be tested by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved by the Contracting Officer. The first inspection shall be at the expense of the Government. Cost incurred for any subsequent inspection required because of failure of the first inspection will be charged to the Contractor.

3.3.2 Testing of Backfill Materials

Classification of backfill materials shall be determined in accordance with ASTM D 2487 and the moisture-density relations of soils shall be determined in accordance with ASTM D 1557. A minimum of one soil classification and one moisture-density relation test shall be performed on each different type of material used for bedding and backfill.

3.3.3 Field Density Tests

Tests shall be performed in sufficient numbers to ensure that the specified density is being obtained. A minimum of one field density test per lift of backfill for every 50 meters feet of installation shall be performed. One moisture density relationship shall be determined for every 1500 cubic meters 1500 cubic yards of material used. Field in-place density shall be determined in accordance with ASTM D 1556 or ASTM D 2922. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using the sand cone method as described in paragraph Calibration of the ASTM publication. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D 3017. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job, on each different type of material encountered, at intervals as directed by the Contracting Officer. Copies of calibration curves, results of calibration tests, and field and laboratory density tests shall be furnished to the Contracting Officer. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Government.

-- End of Section --

SECTION 02910

NATIVE PLANT EXTRACTION, SALVAGE AND STORAGE

PART 1 GENERAL

The Contractor shall furnish qualified personnel, equipment, labor, and materials, and perform all work for native plant material extraction, salvage, and temporary plant storage as specified herein, shown on the Contract Drawings, and as directed by the Contracting Officer.

1.1 PROFESSIONAL OVERSIGHT

The CONTRACTOR shall provide a landscape professional with previous native plant salvage experience to oversee the extraction and salvage operations for the duration of this work type. To be considered qualified, the professional's experience must include at least 3 projects involving the extraction, salvage, and maintenance of cactus and yucca species. See the landscape Contractor's qualification sheet in the bid documents. The Contractor shall use the landscape subcontractor they were successful low bidder with. No substitutions shall be allowed.

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Credentials and Past Project Experience; GA.

The credentials and past project experience of the proposed landscape professional.

Equipment; FIO.

A listing of equipment to be used for the plant extraction and salvage operation.

Fence Materials; GA.

Manufacturers' printed information for all fencing materials to be used to fence the temporary plant storage nursery.

Temporary Irrigation Plan; GA.

The Contractor shall submit a plan outlining the operation of a temporary irrigation system to water plant materials stored in the temporary nursery from the time of salvage to the time of transplanting. The plan shall include water source, water quality report, irrigation equipment, and the specifics of operation. Methods to prevent run-off, puddling and plant

wilting or water stress shall be described.

1.3 INSPECTION

All extracted and salvaged native plant materials shall be inspected for plant condition and damage prior to being taken to the temporary storage facility. Plant materials that have been exposed to heat, excessive root drying, and damaged or mutilated stock shall be rejected and the Contractor will be charged for replacement fees at fair market value. All plants shall be inspected to insure that the north orientation is clearly marked on each plant in such a manner that the marking will be protected during transport, storage, and transplanting.

1.4 REPLACEMENT OF DAMAGED, DEAD, VANDALIZED OR MISSING PLANT MATERIAL

The Contractor shall replace any damaged, dead, vandalized or missing plant materials at no additional cost. Replacement plants shall be of the same species, and size as original stock, and shall be subject to inspection and approval by the contracting officer.

PART 2 PRODUCTS

2.1 NATIVE PLANT MATERIALS

2.1.1 Cacti and Yucca

The following cacti and yucca species shall be extracted, and salvaged from all areas within the construction disturbance zone as shown on the Contract Drawings and as directed by the Contracting Officer.

a. All barrel cactus (Ferocactus cylindraceus)
b. All hedgehog cactus (Echinocereus trigochidiatus)
c. All cottontop cactus (Echinocactus polycephalus)
d. All other cactus over 305 mm tall, or over 305 mm wide including prickly pear (Opuntia erinacea), pencil cactus (Opuntia ramossisma), etc. must be salvaged.
e. All yucca over 305 mm tall including Mohave yucca (Yucca schidigeri), Joshua tree (Yucca brevifolia), banana yucca (Yucca baccata) and soaptree yucca (Yucca elata).

2.1.2 Creosote Bush and White Bursage

The following creosote bush and white bursage shall be extracted and salvaged from the project disturbance zone.

a. **2,770** white bursage from R-4 project site
b. **1,385** crestote bush from R-4 project site

2.2 WATER

Unless otherwise noted, water for plant irrigation shall be the responsibility of the Contractor. Water shall not contain elements toxic to plant life.

2.3 FENCING

Fencing materials for security fencing of the temporary plant nursery shall

conform to the specifications in Section 02821.

PART 3 EXECUTION

3.1 EXTRACTION OF NATIVE PLANT MATERIALS

3.1.1 Extraction Time

Native plant materials shall be extracted and salvaged from January 1 to May 15 for spring work; and from September 15 to December 15 for fall work.

3.1.2 Salvage Conditions

Salvage operations shall be performed only during periods when beneficial results can be obtained. When drought, high temperatures, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the extraction and salvage operations, the Contractor shall propose alternate times for approval by the Contracting officer.

3.1.3 Plant Orientation

The north orientation of each individual cactus and yucca plant shall be marked prior to extraction from the growing site. The marking must be clearly visible and must stay on the plant throughout the extraction, salvage, storage and planting phases. If necessary a compass shall be used to determine the north orientation at the time of marking. Marking shall not result in any damage to the plant such as cuts, bruises, or insertion of any foreign objects into plant tissues.

3.1.4 Yucca Extraction, Salvage, and Storage

Clonal yucca plants may be salvaged as a clump or as individual plants. If salvaged individually each plant must have the north orientation marked prior to extraction from the growing site. If salvaged as a clump each stem also must be marked to provide for the situation that a stem may become detached from the clump during extraction, transport, storage or transplanting. Yucca shall be stored either bare root, healed-in with the rootball wrapped and protected or in containers with the rootball wrapped and protected.

3.1.5 Cactus Extraction, Salvage and Storage

Cactus must have the north orientation marked on each individual plant prior to extraction. The north marking shall be performed to last through extraction, salvage, storage and transplanting. Roots shall be protected at all times from drying and physical damage. Cactus shall be watered as necessary during storage to maintain the health of each plant.

3.1.6 Creosote Bush and White Bursage Extraction, Salvage and Storage

Native creosote bush and white bursage shall be removed with an intact root ball. After extraction the plants shall be put in grow bags to protect the root ball and stored in the temporary nursery. Other containers may be used with the approval of the Contracting Officer. Plants stored in the temporary nursery shall be protected from predators such as rabbits, rodents, etc. during the storage period.

3.2 TEMPORARY ON-SITE PLANT STORAGE

The Contractor shall establish an on-site, temporary plant nursery in the location shown on the Contract Drawings and as directed by the Contracting Officer. The temporary nursery shall include trenches to store the plant materials. The topography of the nursery shall be slightly sloped to drain so that no ponding will occur from irrigation of stored plant materials. The perimeter of the nursery shall be fenced with 1.83 m high chain link fencing with 4 stands of barbed wire on the top and a double-swing gate that can be locked. The gate shall be large enough for a truck to pass through to load, unload, maintain and irrigate the plant materials.

3.2.1 Plant Protection During Storage Period

All native plant materials salvaged from the construction site shall be stored in the designated temporary nursery. Plants shall be protected from exposure to wind and direct sunlight, predators and vandals during the storage period. Plants shall be delivered to the temporary nursery as soon as possible after extraction to avoid drying of plant roots.

3.2.2 Watering Stored Plant Materials

The native plant materials shall be watered every other week during the hottest summer months and once per month in cool months for the duration of the time they are held in the temporary nursery or as directed by the Contracting Officer. Water shall be applied at a rate sufficient to ensure moist soil conditions at a depth that reaches the root zone of each plant species. Run-off, puddling, and wilting shall be prevented.

3.3 CLEAN UP

3.3.1 Clean Up

Excess plant materials and other organic waste material generated from the plant extraction and salvage operation or clearing activities shall be disposed of off-site in a landfill or buried on-site in a location approved by the Contracting Officer. Inorganic waste materials must be hauled off-site to a landfill.

-- End of Section --

SECTION 02921

SEEDING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AGRICULTURAL MARKETING SERVICE (AMS)

AMS Seed Act	(1995) Federal Seed Act Regulations Part 201

1.2 PROFESSIONAL OVERSIGHT

The CONTRACTOR shall provide a landscape professional with previous drill seeding and hydroseeding experience to oversee the seeding operations for the duration of this work type. To be considered qualified, the professional's experience must include at least 3 projects involving drill seeding and hydroseeding. See the landscape Contractor's qualification sheet in the bid documents. The Contractor shall use the landscape subcontractor they were successful low bidder with. No substitutions shall be allowed.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Equipment; FIO. Soil Stabilizer; GA. Chemical Treatment Material; GA.

Manufacturer's literature including physical characteristics, application and installation instructions for equipment, soil stabilizer material and chemical treatment material.

SD-07 Schedules

Equipment; FIO

A listing of equipment to be used for the seeding operation.

SD-08 Statements

Finished Grade and Topsoil; GA.

Finished grade status.

Availability of topsoil from the stripping and stock piling operation.

SD-09 Reports

Soil Sample Fertility Analyses; GA
Equipment Calibration; GA.

Certification of calibration tests conducted on the equipment used in the seeding operation.

SD-13 Certificates

Seed; GA. Fertilizer; GA. Pesticide; GA.

Prior to the delivery of materials, certificates of compliance attesting that materials meet the specified requirements. Certified copies of the material certificates shall include the following:

a. Seed. Classification, botanical name, common name, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, and date tested.

b. Fertilizer. Chemical analysis and composition percent.

c. Pesticide. EPA registration number and registered uses.

d. Soil Stabilizer.

SD-18 Records

Seed Establishment Period; GA.

Calendar time period for the seed establishment period. When there is more than one seed establishment period, the boundaries of the seeded area covered for each period shall be described.

Maintenance Record; GA.

Maintenance work performed, area repaired or reinstalled, diagnosis for unsatisfactory stand of plants.

Application of Pesticide;GA.

Pesticide treatment plan with sequence of treatment work with dates and times. The pesticide trade name, EPA registration number, chemical composition, formulation, concentration of original and diluted material, application rate of active ingredients, method of application, area treated, amount applied; and the name and state license number of the state certified applicator shall be included.

1.4 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.4.1 Delivery

A delivery schedule shall be provided at least 10 calendar days prior to

the first day of delivery.

1.4.1.1 Pesticides

Pesticide material shall be delivered to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses.

1.4.2 Storage

Materials shall be stored in designated areas. Seed, and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment material shall be stored according to manufacturer's instructions and not with seeding operation materials.

1.4.3 Handling

Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.

1.4.4 Time Limitation

Hydroseeding time limitation for holding seed in the slurry shall be a maximum 24 hours.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS Seed Act and applicable state seed laws.

2.1.2 Permanent Seed Species and Mixtures

Permanent seed species and mixtures shall be proportioned by weight as follows:

Scientific Name	Common Name	Kilograms per Hectare	% of Mixture By Weight
Hilaria rigida	Galleta grass	4.6	16
Oryzopsis hymenoides	Indian ricegrass	4.6	16
Sphaeralcea ambigua	Desert globemallow	1.7	6
Encelia virginensis	Virgin Mountains encelia	1.7	6
Baileya multiradiata	Desert Marigold	1.7	6
Eriogonum inflatum	Desert trumpet	1.7	6
Ambrosia dumosa	White bursage	4.2	14
Larrea tridentata	Creosote bush	2.5	8
Ephedra nevadensis	Nevada ephedra	3.5	12
Atriplex canescens	Four-wing saltbush	2.8	10
Total Application Rate		29 kilograms/hectare	100

2.1.3 Quality

Weed seed shall be a maximum 1 percent by weight of the total mixture.

2.1.4 Seed Mixing

The mixing of seed may be done by the seed supplier prior to delivery, or on site as directed.

2.1.5 Substitutions

Substitutions will not be allowed without written request and approval from the Contracting Officer.

2.2 TOPSOIL

The topsoil shall be the existing surface soil stripped and stockpiled onsite in accordance with Section 02200 EXCAVATION. Topsoil shall be free from slag, cinders, lumps of soil, sticks, roots, trash or other material over a minimum 40 mm diameter. Topsoil shall be free from viable plants and plant parts.

2.3 SOIL AMENDMENTS

Soil amendments shall consist of fertilizer meeting the following requirements.

2.3.1 Fertilizer

Fertilizer composition shall be formulated as recommended by the soil test. Fertilizer shall be controlled release commercial grade, free flowing, uniform in composition, and consist of a nitrogen-phosphorus-potassium ratio. The fertilizer shall be derived from sulphur coated urea, urea formaldehyde, plastic or polymer coated pills, or isobutylenediurea (IBDU). Fertilizer shall be balanced with the inclusion of trace minerals and micro-nutrients.

2.3.1.1 Nitrogen Carrier Fertilizer

It shall be as recommended by the soil test. Nitrogen carrier fertilizer shall be commercial grade, free flowing, and uniform in composition. The fertilizer may be a liquid nitrogen solution.

2.3.1.2 Super Absorbent Polymers

To improve water retention in soils, super absorbent polymers shall be sized and applied according to the manufacturer's recommendations. Polymers shall be added as a soil amendment and be cross-linked polyacrylamide, with an absorption capacity of 250-400 times its weight. Polymers shall also be added to the seed and be a starch grafted polyacrylonitrite, with graphite added as a tacky sticker. It shall have an absorption capacity of 100 plus times its weight.

2.4 SOIL STABILIZER

Soil stabilizer shall be a mixture of plaster and natural cellulose fiber mulch. The plaster cellulose fiber mulch stabilizer shall be Plas-Tex™

Soil Stabilizer as formulated by Soil-Tech Co., 5375 Cameron Dr., Las Vegas, NV 89118 (702) 873-2023) or approved equal. Proposed substitutions must be submitted to the Contracting Officer for review and approval.

2.4.1 Soil Stabilizer Properties

The plaster shall consist of naturally occurring high purity gypsum and necessary additives, such as retarders and accelerators and water to formulate a binder that will produce a protective crust-like barrier within 4 to 8 hours after application.

The gypsum shall be produced from a quarried or mined source. In addition, the processed gypsum shall be composed of a crushed dry calcium sulfate hemihydrate (CA S04 ½H2O) having a purity of not less than 88 percent. The processed gypsum plus necessary additives shall be furnished either in bags or bulk and be accompanied by certificates stating the gypsum's purity content, dry weight and source of manufacture. Processed gypsum, which has become partially air set, lumpy or caked, shall not be used.

The cellulose fiber mulch shall be produced from grinding clean, whole wood chips. The wood chips shall be thermally dehydrated to produce a high quality blend of fibers, dyed with a non-toxic vegetable based dye to aid in visual metering during application. The moisture content shall average 12 percent.

A color pigment shall be added to the slurry at the time of application. The pigment color shall be selected to blend with the existing site colors. Sample test plots of the proposed pigment color(s) shall be tested at the project site and approved by the Contracting Officer prior to application on the specified areas.

2.4.2 Wood Cellulose Fiber

Wood cellulose fiber shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

2.5 WATER

Water shall be the responsibility of the Contractor. Water shall not contain elements toxic to plant life.

2.6 PESTICIDE

Pesticide shall be insecticide, herbicide, fungicide, nematocide, rodenticide or miticide. For the purpose of this specification, a soil fumigant shall have the same requirements as a pesticide. The pesticide material shall be EPA registered and approved.

PART 3 EXECUTION

3.1 INSTALLING SEED TIME AND CONDITIONS

3.1.1 Seeding Time

Seed shall be installed from March 1 to April 15 for spring establishment;

and from September 1 to October 15 for fall establishment.

3.1.2 Seeding Conditions

Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.

3.1.3 Equipment Calibration

Immediately prior to the commencement of seeding operations, calibration tests shall be conducted on the equipment to be used. These tests shall confirm that the equipment is operating within the manufacturer's specifications and will meet the specified criteria. The equipment shall be calibrated a minimum of once every day during the operation. The calibration test results shall be provided within 1 week of testing.

3.2 SITE PREPARATION

3.2.1 Finished Grade and Topsoil

The Contractor shall verify that finished grades are as indicated on drawings, and the placing of topsoil, smooth grading, and compaction requirements have been completed in accordance with Section 02250 FILLS AND SUBGRADE PREPARATION, prior to the commencement of the seeding operation.

3.2.2 Application of Soil Amendments

3.2.2.1 Applying Fertilizer

The fertilizer shall be applied as recommended by the soil test. Fertilizer shall be incorporated into the soil to a maximum 100 mm depth or may be incorporated as part of the tillage or hydroseeding operation.

3.2.2.2 Applying Super Absorbent Polymers

Polymers shall be spread uniformly over the soil as recommended by the manufacturer and thoroughly incorporated by tillage into the soil to a maximum 100 mm depth.

3.2.3 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical shall be tilled to a minimum 100 mm depth. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum 50 mm depth by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1 vertical and steeper, no tillage is required. Drainage patterns shall be maintained as indicated on drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The fertilizer may be applied during this procedure.

3.2.4 Prepared Surface

3.2.4.1 Preparation

The prepared surface shall be a maximum 25 mm below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris.

3.2.4.2 Protection

Areas with the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.

3.3 INSTALLATION

Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.3.1 Installing Seed

Seeding method shall be Broadcast Seeding, Drill Seeding or Hydroseeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be used because of the difficulty in achieving even coverage, unless otherwise approved. Absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.

3.3.1.1 Broadcast Seeding

Seed shall be uniformly broadcast at the rate of 29 kilograms per hectare using broadcast seeders. Half the total rate of seed application shall be broadcast in 1 direction, with the remainder of the seed rate broadcast at 90 degrees from the first direction. Seed shall be covered a maximum 6 mm depth by disk harrow, steel mat drag, cultipacker, or other approved device. Broadcast seeding shall be used in all areas not reachable by hydroseeding, or areas behind boulders.

3.3.1.2 Drill Seeding

Seed shall be uniformly drilled to a maximum 13 mm depth and at the rate of 29 kilograms per hectare, using equipment having drills a maximum 175 mm distance apart. Row markers shall be used with the drill seeder. Half the total rate of seed application shall be drilled in 1 direction, with the remainder of the seed rate drilled at 90 degrees from the first direction. The drilling equipment shall be maintained with half full seed boxes during the seeding operations. Drill seeding shall be used on all areas flatter than 10H:1V.

3.3.1.3 Rolling

The entire area shall be firmed with a roller not exceeding 130 kilograms per meter roller width. Slopes over a maximum 3-horizontal-to-1 vertical shall not be rolled. Areas seeded with seed drills equipped with rollers shall not be rolled.

3.3.2 Hydroseeding

Seed shall be mixed to ensure broadcast at the rate of 29 kilograms per hectare. Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified. The time period for the seed to be held in the slurry shall be a maximum 24 hours. Wood cellulose fiber mulch and tackifier shall be added at the rates recommended by the manufacturer after the seed, fertilizer, and water have been thoroughly mixed to produce a homogeneous slurry. Slurry shall be uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled. Hydroseeding shall be used on slopes steeper than 10H:1V.

3.3.3 Application of Soil Stabilizer

The plaster/cellulose fiber mulch stabilizer shall be applied at a rate of 2,240 kilograms of plaster per hectare and 1,685 kilograms of wood fiber mulch per hectare. The specified seed mixture shall be added to the stabilizer mulch slurry. The slurry shall be such that when applied, the material shall form a protective coating that reduces water and wind induced erosion. Application shall bot be permitted during high winds or when other weather conditions are unsuitable.

A minimum of three 3.0 meter x 3.0 meter on-site test plots shall be sprayed to determine the pigment color for the slurry. The Contracting Officer shall approve the pigment color prior to the Contractor beginning application on the project areas.

3.3.4 Wood Cellulose Fiber, Paper Fiber, and Recycled Paper

Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations.

3.3.5 Watering Seed

Watering shall be started immediately after completing the seeding of an area. Water shall be applied once every other week during the hottest summer months and once per month during the remainder of the first year or as directed by the Contracting Officer. Run-off and puddling shall be prevented. Watering trucks shall not be driven over seeded areas, unless otherwise directed. Watering of other adjacent areas or plant material shall be prevented.

3.4 QUANTITY CHECK

For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as a record of the amount used. The amount of material used shall be compared with the total area covered to determine the rate of application used. Differences between the quantity applied and the quantity specified shall be adjusted as directed.

3.5 APPLICATION OF PESTICIDE

When application of a pesticide becomes necessary to remove a pest or disease, a pesticide treatment plan shall be submitted and coordinated with the pest management program.

3.5.1 Technical Representative

The certified installation pest management coordinator shall be the technical representative, and shall be present at all meetings concerning treatment measures for pest or disease control. They may be present during treatment application.

3.5.2 Application

A state certified applicator shall apply required pesticides in accordance with EPA label restrictions and recommendations. Clothing and personal protective equipment shall be used as specified on the pesticide label. A closed system is recommended as it prevents the pesticide from coming into contact with the applicator or other persons. Water for formulating shall only come from designated locations. Filling hoses shall be fitted with a backflow preventer meeting local plumbing codes or standards. Overflow shall be prevented during the filling operation. Prior to each day of use, the equipment used for applying pesticide shall be inspected for leaks, clogging, wear, or damage. Any repairs are to be performed immediately. A pesticide plan shall be submitted.

3.6 RESTORATION AND CLEAN UP

3.6.1 Restoration

Seeded areas, plant materials, and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.

3.6.2 Clean Up

Excess and waste material shall be removed from the seeded areas and shall be disposed offsite. Adjacent paved areas shall be cleaned.

3.7 PROTECTION OF INSTALLED AREAS

Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed.

3.8 SEED ESTABLISHMENT PERIOD

3.8.1 Commencement

The seed establishment period to obtain a healthy stand of plants shall begin after the last day of the seeding operation and shall end 6 months later. Written calendar time period shall be furnished for the seed establishment period. The seed establishment period shall be coordinated with Section 02930 EXTERIOR PLANTING. The seed establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

3.8.2 Satisfactory Stand of Plants

Shrubs shall be evaluated for species and health when the plants are 15 to 30 cm high. Herbaceous plants shall be evaluated for health at a height of 80 mm.

3.8.2.1 Slopes and Field Areas

A satisfactory stand of plants from the seeding operation for slopes field area shall be a minimum 100 plants per square meter. The total bare spots shall not exceed 2 percent of the total seeded area.

3.8.3 Maintenance During Establishment Period

Maintenance of the seeded areas shall include eradicating weeds, insects and diseases; protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from traffic; watering; and post-fertilization.

3.8.3.1 Post-Fertilization

The fertilizer shall be applied as recommended by the soil test. A maximum 4 kilograms per hectare of actual available nitrogen shall be provided to the plants. The application shall be timed prior to the advent of winter dormancy and shall be made without burning the **installed plants**.

3.8.3.2 Pesticide Treatment

Treatment for disease or pest shall be in accordance with paragraph APPLICATION OF PESTICIDE.

3.8.3.3 Repair or Reinstall

Unsatisfactory stand of plants and mulch shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph SITE PREPARATION.

3.8.3.4 Maintenance Record

A record of each site visit shall be furnished, describing the maintenance work performed; areas repaired or reinstalled; and diagnosis for unsatisfactory stand of plants.

-- End of Section --

SECTION 03101

FORMWORK FOR CONCRETE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 347R	(1994) Guide to Formwork for Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31/C 31M	(1998) Making and Curing Concrete Test Specimens in the Field
ASTM C 39/C 39M	(1999) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 1077	(1998) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation

DEPARTMENT OF COMMERCE (DOC)

DOC PS 1	(1996) Voluntary Product Standard - Construction and Industrial Plywood

1.2 DESIGN REQUIREMENTS

The design, engineering, and construction of the formwork shall be the responsibility of the Contractor. The formwork shall be designed for anticipated live and dead loads, lateral pressures, and allowable stresses in accordance with Chapter 1 of ACI 347R. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete and shall have sufficient rigidity to maintain specified tolerances. However, for surfaces with an ACI Class A surface designation, the allowable deflection for facing material between studs, for studs between walers and walers between bracing shall be limited to 0.0025 times the span. The formwork shall be designed as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others. The adequacy of formwork design and construction shall be monitored prior to and during concrete placement as part of the Contractor's approved Quality Control Plan.

1.3 SUBMITTALS

Government approval is required for all submittals with a "GA" designation;

submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Materials; FIO.

Manufacturer's literature shall be submitted for plywood, concrete form hard board, form accessories, prefabricated forms, form coating.

SD-04 Drawings

Shop Drawings; FIO.

Drawings and design computations for all formwork required shall be submitted at least 30 days either before fabrication on site or before delivery of prefabricated forms.

SD-08 Statements

Shop Drawings; FIO.

If reshoring is permitted, the method, including location, order, and time of erection and removal shall also be submitted for review.

SD-09 Reports

Inspection; FIO.

The Contractor shall submit field inspection reports for concrete forms and embedded items.

Formwork Not Supporting the Weight of Concrete; GA.

Formwork for walls, columns, sides of beams, gravity structures, and other vertical type formwork not supporting the weight of concrete shall not be removed in less than 24 hours after concrete placement is completed. The evaluation and results of the control cylinder tests shall be submitted and approved before the forms are removed.

1.4 SHOP DRAWINGS

The shop drawings and data submitted shall include the type, size, quantity, and strength of all materials of which the forms are made, the plan for jointing of facing panels, details affecting the appearance, and the assumed design values and loading conditions.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Forms and Form Liners

Forms and form liners shall be fabricated with facing materials that will produce a finish meeting the specified construction tolerance requirements

and the following surface classifications as defined in ACI 347R and as adjusted in Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS.

2.1.1.1 Class "A" Finish

This class of finish shall apply to all concrete which will be exposed to flowing water during the structure's lifetime. The form facing material shall be composed of new, well-matched tongue-and-groove lumber or new plywood panels conforming to DOC PS 1, Grade B-B concrete form, Class I.

2.1.1.2 Class "B" Finish

This class of finish shall apply to all surfaces except those specified to receive Class A, or Class D. The form facing material shall be composed of tongue-and-groove or shiplap lumber, plywood conforming to DOC PS 1, Grade B-B concrete form, tempered concrete form hard board or steel. Steel lining on wood sheathing will not be permitted.

2.1.1.4 Class "D" Finish

This class of finish shall apply to concrete faces against which earthfill will be placed. The form facing may be of wood or steel.

2.1.2 Form Coating

Form coating shall be commercial formulation that will not bond with, stain, cause deterioration, or any other damage to concrete surfaces. The coating shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion nor impede the wetting of surfaces to be cured with water or curing compounds. If special form liners are to be used, the Contractor shall follow the recommendation of the form coating manufacturer.

2.2 ACCESSORIES

Ties and other similar form accessories to be partially or wholly embedded in the concrete shall be of a commercially manufactured type. After the ends or end fasteners have been removed, the embedded portion of metal ties shall terminate not less than 50 mm from any concrete surface either exposed to view or exposed to water. Plastic snap ties may be used in locations where the surface will not be exposed to view. Form ties shall be constructed so that the ends or end fasteners can be removed without spalling the concrete.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Form Construction

Forms shall be constructed true to the structural design and required alignment. The form surface and joints shall be mortar tight and supported to achieve safe performance during construction, concrete placement, and form removal. The Contractor shall continuously monitor the alignment and stability of the forms during all phases to assure the finished product will meet the required surface class or classes specified in paragraph FORMS AND FORM LINERS and tolerances specified in paragraph DESIGN

REQUIREMENTS. Failure of any supporting surface either due to surface texture, deflection or form collapse shall be the responsibility of the Contractor as will the replacement or correction of unsatisfactory surfaces. When forms for continuous surfaces are placed in successive units, care shall be taken to fit the forms over the completed surface to obtain accurate alignment of the surface and to prevent leakage of mortar. Forms shall not be re-used if there is any evidence of defects which would impair the quality of the resulting concrete surface. All surfaces of used forms shall be cleaned of mortar and any other foreign material before reuse.

3.1.2 Chamfering

All exposed joints, edges and external corners shall be chamfered by molding placed in the forms unless the drawings specifically state that chamfering is to be omitted or as otherwise specified. Chamfered joints shall not be permitted where earth or rockfill is placed in contact with concrete surfaces. Chamfered joints shall be terminated 300 mm twelve inches outside the limit of the earth or rockfill so that the end of the chamfers will be clearly visible.

3.1.3 Coating

Forms for exposed or painted surfaces shall be coated with form oil or a form-release agent before the form or reinforcement is placed in final position. The coating shall be used as recommended in the manufacturer's instructions. Forms for unexposed surfaces may be wet with water in lieu of coating immediately before placing concrete, except that, in cold weather when freezing temperatures are anticipated, coating shall be mandatory. Surplus coating on form surfaces and coating on reinforcing steel and construction joints shall be removed before placing concrete.

3.2 FORM REMOVAL

Forms shall not be removed without approval. The minimal time required for concrete to reach a strength adequate for removal of formwork without risking the safety of workers or the quality of the concrete depends on a number of factors including, but not limited to, ambient temperature, concrete lift heights, type and amount of concrete admixture, and type and amount of cementitious material in the concrete. It is the responsibility of the Contractor to consider all applicable factors and leave the forms in place until it is safe to remove them. In any case forms shall not be removed unless the minimum compressive strength/time requirements below are met, except as otherwise directed or specifically authorized. When conditions are such as to justify the requirement, forms will be required to remain in place for a longer period. All removal shall be accomplished in a manner which will prevent damage to the concrete and ensure the complete safety of the structure. Where forms support more than one element, the forms shall not be removed until the form removal criteria are met by all supported elements. Form removal shall be scheduled so that all necessary repairs can be performed as specified in Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS, paragraph FORMED SERVICES. Evidence that concrete has gained sufficient strength to permit removal of forms shall be determined by tests on control cylinders. All control cylinders shall be stored in the structure or as near the structure as possible so they receive the same curing conditions and protection methods as given those portions of the structure they represent. Control cylinders shall be removed from the molds at an age of no more than 24

hours. All control cylinders shall be prepared and tested in accordance with ASTM C 31/C 31M and ASTM C 39/C 39M at the expense of the Contractor by an independent laboratory that complies with ASTM C 1077 and shall be tested within 4 hours after removal from the site.

3.2.1 Formwork Not Supporting Weight of Concrete

Formwork for walls, columns, sides of beams, gravity structures, and other vertical type formwork not supporting the weight of concrete shall not be removed in less than 24 hours after concrete placement is completed.

3.2.2 Formwork Supporting Weight of Concrete

Formwork supporting weight of concrete and shoring shall not be removed until structural members have acquired sufficient strength to safely support their own weight and any construction or other superimposed loads to which the supported concrete may be subjected. As a minimum, forms shall be left in place until control concrete test cylinders indicate evidence the concrete has attained at least 70 percent of the compressive strength required for the structure in accordance with the quality and location requirements of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS, paragraph REQUIRED AVERAGE COMPRESSIVE STRENGTH.

3.3 INSPECTION

Forms and embedded items shall be inspected in sufficient time prior to each concrete placement by the Contractor in order to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing.

-- End of Section --

SECTION 03301

CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ACI INTERNATIONAL (ACI)

ACI 117/117R	(1990; Errata) Standard Tolerances for Concrete Construction and Materials
ACI 211.1	(1991) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 214	(1977; R 1997) Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 305R	(1991) Hot Weather Concreting
ACI 318M	(1995) Metric Building Code Requirements for Structural Concrete and Commentary

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 31/C 31M	(1998) Making and Curing Concrete Test Specimens in the Field
ASTM C 33	(1999ael) Concrete Aggregates
ASTM C 39/C 39M	(1999) Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42/C 42M	(1999) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 94/C 94M	(2000) Ready-Mixed Concrete
ASTM C 136	(1996a) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 143/C 143M	(1998) Slump of Hydraulic Cement Concrete
ASTM C 150	(1999a) Portland Cement
ASTM C 171	(1997a) Sheet Materials for Curing Concrete
ASTM C 172	(1999) Sampling Freshly Mixed Concrete

ASTM C 192/C 192M	(1998) Making and Curing Concrete Test Specimens in the Laboratory
ASTM C 231	(1997el) Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 260	(1998) Air-Entraining Admixtures for Concrete
ASTM C 309	(1998a) Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494/C 494M	(1999a) Chemical Admixtures for Concrete
ASTM C 566	(1997) Evaporable Total Moisture Content of Aggregate by Drying
ASTM C 597	(1983; R 1997) Pulse Velocity Through Concrete
ASTM C 618	(1999) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 803/C 803M	(1997el) Penetration Resistance of Hardened Concrete
ASTM C 805	(1997) Rebound Number of Hardened Concrete
ASTM C 881	(1999) Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C 1059	(1999) Latex Agents for Bonding Fresh to Hardened Concrete
ASTM C 1064/C 1064M	(1999) Temperature of Freshly Mixed Portland Cement Concrete
ASTM C 1077	(1998) Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1107	(1999) Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM D 75	(1987; R 1997) Sampling Aggregates
ASTM D 1751	(1983; R 1991) Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non extruding and Resilient Bituminous Types)

CORPS OF ENGINEERS (COE)

COE CRD-C 94	(1995) Surface Retarders

COE CRD-C 100	(1975) Method of Sampling Concrete Aggregate and Aggregate Sources, and Selection of Material for Testing
COE CRD-C 104	(1980) Method of Calculation of the Fineness Modulus of Aggregate
COE CRD-C 143	(1962) Specifications for Meters for Automatic Indication of Moisture in Fine Aggregate
COE CRD-C 400	(1963) Requirements for Water for Use in Mixing or Curing Concrete
COE CRD-C 521	(1981) Standard Test Method for Frequency and Amplitude of Vibrators for Concrete

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST HB 44	(1997) NIST Handbook 44: Specifications, Tolerances, and other Technical Requirements for Weighing and Measuring Devices

NATIONAL READY-MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA CPMB 100	(1996) Concrete Plant Standards

1.2 SUBMITTALS

Government approval is required for all submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES.

SD-01 Data

Concrete Mixture Proportioning-General; GA.

Concrete mixture proportions shall be determined by the Contractor, in accordance with the requirements in paragraph CONCRETE MIXTURE PROPORTIONING, and submitted for review. The concrete mixture quantities of all ingredients per cubic meter and nominal maximum coarse aggregate size that will be used in the manufacture of each quality of concrete shall be stated. Proportions shall indicate the mass of cement, pozzolan when used, and water; the mass of aggregates in a saturated surface-dry condition; and the quantities of admixtures. The submission shall be accompanied by test reports from a laboratory complying with ASTM C 1077 which show that proportions thus selected will produce concrete of the qualities indicated. No substitution shall be made in the source or type of materials used in the work without additional tests to show that the quality of the new materials and concrete are satisfactory.

Concrete Mixture Proportioning - Government Supplied Mix Design; GA.

The Government will prepare mix designs for the use of the lithium based admixtures in the construction. Mix designs for channel invert

construction and for road construction as indicated on the drawings will be prepared by the Government.

Concrete Mixers; FIO.

The Contractor shall submit concrete mixer data which includes the make, type, and capacity of concrete mixers proposed for mixing concrete in conformance with the paragraphs CAPACITY and CONCRETE MIXERS.

Conveying Equipment and Methods; FIO.

The conveying equipment and methods for transporting, handling, and depositing the concrete shall be submitted for review by the Contracting Officer for conformance with paragraphs CAPACITY and CONVEYING EQUIPMENT.

Placing Equipment and Methods; FIO.

All placing equipment and methods shall be submitted for review by the Contracting Officer for conformance with paragraph CAPACITY.

SD-08 Statements

Testing Technicians; FIO. Concrete Construction Inspector; FIO.

The Contractor shall submit statements that the concrete testing technicians and the concrete inspectors meet the requirements of paragraph TESTS AND INSPECTIONS.

Construction Joint Treatment; GA.

The method and equipment proposed for joint cleanup and waste disposal shall be submitted for review and approval for conformance with paragraph CONSTRUCTION JOINT TREATMENT.

Curing and Protection; GA.

The curing medium and methods to be used shall be submitted for review and approval for conformance with paragraph CURING AND PROTECTION.

Cold-Weather Placing; GA.

If concrete is to be placed under cold-weather conditions, the proposed materials, methods, and protection meeting the requirements of paragraph COLD-WEATHER PLACING shall be submitted for approval.

Hot-Weather Placing; GA.

If concrete is to be placed under hot-weather conditions, the proposed materials and methods, meeting the requirements of paragraph HOT-WEATHER PLACING and paragraph FINISHING, shall be submitted for review and approval.

SD-09 Reports

Aggregate Quality; GA.

Aggregate quality tests shall be submitted at least 30 days prior to start of concrete placement, in accordance with the applicable COE CRD-C or ASTM

test methods.

Uniformity of Concrete Mixing; FIO.

The results of the initial mixer uniformity tests as required in paragraph MIXER UNIFORMITY shall be submitted at least 5 days prior to the initiation of placing.

Tests and Inspections; FIO.

Test results and inspection reports shall be submitted daily and weekly as required in paragraph REPORTS.

SD-13 Certificates

Cementitious Materials; FIO.

Cementitious Materials, including Cement and Pozzolan, will be accepted on the basis of the manufacturer's certification of compliance, accompanied by mill test reports that materials meet the requirements of the specification under which they are furnished. Certification and mill test reports shall be from samples taken from the particular lot furnished. No cementitious materials shall be used until notice of acceptance has been given by the Contracting Officer. Cementitious materials will be subject to check testing from samples obtained at the source, at transfer points, or at the project site, as scheduled by the Contracting Officer, and such sampling will be by or under the supervision of the Government at its expense. Material not meeting specifications shall be promptly removed from the site of work.

Other Chemical Admixtures; FIO.

Other Chemical Admixtures shall be certified for compliance with all specification requirements.

Membrane-Forming Curing Compound; FIO

Membrane-Forming Curing Compound shall be certified for compliance with all specification requirements.

Epoxy Resin; FIO. Latex Bonding Compound; FIO.

Epoxy Resin and Latex Bonding Compound shall be certified for compliance with all specification requirements.

Nonshrink Grout; FIO

Descriptive literature of the nonshrink grout proposed for use shall be furnished together with a certificate from the manufacturer stating that it is suitable for the application for which it is being considered.

1.3 GOVERNMENT TESTING AND SAMPLING

The Government will sample and test aggregates and concrete to determine compliance with the specifications. The Contractor shall provide facilities and labor as may be necessary for procurement of representative test samples. Samples of aggregates will be obtained at the point of

batching in accordance with ASTM D 75. Concrete will be sampled in accordance with ASTM C 172.

1.3.1 Preconstruction Sampling and Testing

1.3.1.1 Aggregates

The aggregate sources listed herein have been tested and at the time testing was performed were capable of producing materials of a quality required for this project provided suitable processing is performed. The Contractor may furnish materials from a listed source or from a source not listed. Samples from any source of coarse aggregate and any source of fine aggregate selected by the Contractor, consisting of not less than 70 kg of each size coarse aggregate and 35 kg of fine aggregate taken under the supervision of the Contracting Officer in accordance with COE CRD-C 100 shall be delivered to a local materials testing laboratory within 15 days after notice to proceed. Sampling and shipment of samples shall be at the Contractor's expense. Sixty (60) days will be required to complete evaluation of the aggregates. Testing will be performed by and at the expense of the Government in accordance with the applicable COE CRD-C or ASTM test methods. The cost of testing one source for each size of aggregate will be borne by the Government. If the Contractor selects more than one source for each aggregate size or selects a substitute source for any size aggregate after the original source was tested, the cost of that additional testing will be borne by the Contractor. Tests to which aggregate may be subjected are specific gravity absorption, soft particles, L.A. abrasion, and any test necessary to demonstrate that the aggregate is of a quality that is at least equivalent to these sources listed herein and meeting the requirements of ASTM C 33. The Government's test data and other information on aggregate quality of those sources listed herein are included in the Design Memorandum and are available for review in the district office. Testing of aggregates by the Government does not relieve the Contractor of the requirements outlined in paragraph TESTS AND INSPECTIONS.

1.3.1.2 Cementitious Materials, Admixtures, and Curing Compound

At least 60 days in advance of concrete placement, the Contractor shall notify the Contracting Officer of the sources for cementitious materials, admixtures, and curing compounds, along with sampling location, brand name, type, and quantity to be used in the manufacture and/or curing of the concrete.

1.3.2 Construction Testing by the Government

Sampling and testing will be performed by and at the expense of the Government except as otherwise specified. No material shall be used until notice has been given by the Contracting Officer that test results are satisfactory.

1.3.2.1 Chemical Admixtures Storage

Chemical admixtures that have been in storage at the project site for longer than 6 months or that have been subjected to freezing shall be retested at the expense of the Contractor when directed by the Contracting Officer and shall be rejected if test results are not satisfactory. Chemical admixtures will be accepted based on compliance with the requirements of paragraph CHEMICAL ADMIXTURES.

1.3.2.2 Cement and Pozzolan

If cement or pozzolan is to be obtained from more than one source, the initial notification shall state the estimated amount to be obtained from each source and the proposed schedule of shipments.

1.3.2.3 Concrete Strength

Compressive strength test specimens will be made by the Government and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M. The strength of the concrete will be considered satisfactory so long as the average of all sets of three consecutive test results equals or exceeds the specified compressive strength f'c and no individual test result falls below the specified strength f'c by more than 3.5 MPa. A "test" is defined as the average of two companion cylinders, or if only one cylinder is tested, the results of the single cylinder test. Additional analysis or testing, including nondestructive testing, taking cores and/or load tests may be required at the Contractor's expense when the strength of the concrete in the structure is considered potentially deficient.

a. Investigation of Low-Strength Test Results - When any strength test of standard-cured test cylinders falls below the specified strength requirement by more than 3.5 MPa or if tests of field-cured cylinders indicate deficiencies in protection and curing, steps shall be taken to assure that the load-carrying capacity of the structure is not jeopardized. Nondestructive testing in accordance with ASTM C 597, ASTM C 803/C 803M, or ASTM C 805 may be permitted by the Contracting Officer to estimate the relative strengths at various locations in the structure as an aid in evaluating concrete strength in place or for selecting areas to be cored. Such tests shall not be used as a basis for acceptance or rejection.

b. Testing of Cores - When the strength of concrete in place is considered potentially deficient, cores shall be obtained and tested in accordance with ASTM C 42/C 42M. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. The location of cores will be determined by the Contracting Officer to least impair the performance of the structure. Concrete in the area represented by the core testing will be considered adequate if the average strength of the cores is equal to at least 85 percent of the specified strength requirement and if no single core is less than 75 percent of the specified strength requirement.

c. Load Tests - If the core tests are inconclusive or impractical to obtain or if structural analysis does not confirm the safety of the structure, load tests may be directed by the Contracting Officer in accordance with the requirements of ACI 318M ACI 318/318R. Concrete work evaluated by structural analysis or by results of a load test shall be corrected in a manner satisfactory to the Contacting Officer. All investigations, testing, load tests, and correction of deficiencies will be performed and approved by the Contracting Officer at the expense of the Contractor, except that if all concrete is in compliance with the plans and specifications, the cost of investigations, testing, and load tests will be at the expense of the Government.

1.3.3 TECHNICAL SUPPORT FOR LITHIUM ADMIXTURE

The contractor will supply support for use of the Lithium based concrete admixture. The support will be supplied by a representative of the manufacturer of the admixture selected by the Contractor. The representative will be required to supply support to the Government during the preparation of the Government supplied mix designs and will be required to be on-site during placements of the concrete containing the lithium admixture. The representative will (may) be required to travel to the Waterways Experiment Station in Vicksburg MS, and will be required to be present at the site for the batch plant preparation and initial placement of concretes containing the lithium admixture.Text

1.3.4 ACCEPTANCE OF PAVEMENTS

The pavement will be accepted on the basis of tests made by the Government and by the Contractor or its suppliers, as specified herein. The Government may, at its discretion, make check tests to validate the results of the Contractor's testing. Concrete samples shall be taken by the Contractor at the placement to determine the slump, air content, and strength of the concrete. Test cylinders shall be made for determining conformance with the strength requirements of these specifications and, when required, for determining the time at which pavements may be placed into service. All air content measurements shall be determined in accordance with ASTM C 231. All slump tests shall be made in accordance with ASTM C 143. All test cylinders shall be 150 by 300 mm cylinders and shall be fabricated in accordance with ASTM C 192, using only steel molds, cured in accordance with ASTM C 31, and tested in accordance with ASTM C 39. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days. The Contractor shall furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory.

1.3.4.1 Surface Testing for Pavements

Surface testing for surface smoothness, edge slump, and plan grade shall be performed as indicated below by the Testing Laboratory. The measurements shall be properly referenced in accordance with paving lane identification and stationing, and a report given to the Government within 24 hours after measurement is made. A final report of surface testing, signed by a Registered Engineer, containing all surface measurements and a description of all actions taken to correct deficiencies, shall be provided to the Government upon conclusion of surface testing.

1.3.4.1.1 Surface Smoothness Requirements

The finished surfaces of the pavements shall have no abrupt change of 3 mm or more, and all pavements shall be within the tolerances specified in Table 1 when checked with the straightedge.

TABLE 1
STRAIGHTEDGE SURFACE SMOOTHNESS--PAVEMENTS

Pavement Category	Direction of Testing	Tolerances mm
Roads and Streets	Longitudinal	5
	Transverse	6.5

1.3.4.1.2 Surface Smoothness Testing Method

The surface of the pavement shall be tested with the straightedge to identify all surface irregularities exceeding the tolerances specified above. The entire area of the pavement shall be tested in both a longitudinal and a transverse direction on parallel lines approximately 4.5 m apart. The straightedge shall be held in contact with the surface and moved ahead one-half the length of the straightedge for each successive measurement. The amount of surface irregularity shall be determined by placing the straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface, in the area between these two high points.

1.3.4.2 Plan Grade Testing and Conformance

The finished surface of the pavements shall conform, within the tolerances shown in Table 1, to the lines, grades, and cross sections shown. The finished surface of new abutting pavements shall coincide at their juncture. The surfaces of pavements shall vary not more than 18 mm above or below the plan grade line or elevation indicated. The pavements shall be checked by the Contractor for conformance with plan grade requirements by running lines of levels at intervals to determine the elevation at each joint intersection.

1.3.5 Government Mixture Proportioning Studies

The Government will proportion concrete mixtures, containing the lithium admixture, for use in the specified construction. At least 60 days in advance of the time when placing of concrete is expected to begin, samples of representative materials proposed for this project and meeting all the requirements of this specification shall be delivered to:

Toy Poole
CEERD-GM-C
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

by the Contractor at his expense. Samples of aggregates shall be taken under the supervision of the Contracting Officer in accordance with COE CRD-C 100, accompanied by test reports indicating conformance with grading and quality requirements hereinafter specified. Samples of materials other than aggregates shall be representative of those proposed for the project and shall be submitted accompanied by manufacturer's test reports indicating compliance with applicable specified requirements. Quantities of materials required shall be as follows:

MATERIAL	QUANTITY
Coarse aggregate	4700 kg
Fine aggregate	5400 kg
Cement	2800 kg
Pozzolans	1200 kg

Air-entraining admixture	**10 liters**
Lihium Admixture	**50 liters**
Water Reducing Admixture	**10 liters**

Mixture-proportioning studies will be made by the Government at its expense.

1.4 DESIGN REQUIREMENTS

1.4.1 Concrete Strength

Specified compressive strength f'c shall be as follows:

COMPRESSIVE STRENGTH (MPa)	STRUCTURE OR PORTION OF STRUCTURE
30 @ 28 days	Box culvert, open channel, spillways, manholes, retaining walls, and similar types of structure
25 @ 28 days	Other general construction

COMPRESSIVE STRENGTH (PSI)	STRUCTURE OR PORTION OF STRUCTURE
[5,000 @ [_____] days	[_____]]
[4,000 @ [_____] days	[_____]]
[3,000 @ [_____] days	[_____]]
[2,500 @ [_____] days	[_____]]
[[_____] @ [_____] days	[_____]]

1.4.2 Maximum Water-Cement (W/C) Ratio

Maximum water-cement ration shall be 0.45 for all concrete structures. The W/C may cause higher strengths than that required by paragraph CONCRETE STRENGTH.

1.5 CONSTRUCTION TOLERANCES

1.5.1 General

The definitions of the terms used in the following tables shall be as defined in ACI 117/117R. Level and grade tolerance measurements of slabs shall be made as soon as possible after finishing. When forms or shoring are used, the measurements shall be made prior to removal. Tolerances are not cumulative. The most restrictive tolerance controls. Tolerances shall not extend the structure beyond legal boundaries. Except as specified otherwise, plus tolerance increases the amount or dimension to which it applies, or raises a level alignment, and minus tolerance decreases the amount or dimension to which it applied, or lowers a level alignment. A tolerance without sign means plus or minus. Where only one signed tolerance is specified, there is no limit in the other direction.

TOLERANCE FOR FINISHED FORMED CONCRETE SURFACES

(1) Vertical alignment

TOLERANCE FOR FINISHED FORMED CONCRETE SURFACES

Formed surfaces slope with respect to the specified plane

Vertical alignment..... 10 mm in 3000 mm

(2) Abrupt variation

The offset between concrete surfaces for the following classes of surface:

Class A	3 mm
Class B	6 mm
Class C	6 mm
Class D	25 mm

(3) Gradual variation

Surface finish tolerances as measured by placing a freestanding (unleveled), 1.5 m straightedge for plane surface or curved template for curved surface anywhere on the surface and allowing it to rest upon two high spots within 72 hr after concrete placement. The gap at any point between the straightedge or template and the surface shall not exceed:

Class A	3 mm
Class B	6 mm
Class C	13 mm
Class D	25 mm

TOLERANCES FOR CHANNEL LINING

(1) Lateral alignment

Alignment of tangents	50 mm
Alignment of curves	100 mm
Width of section at any height	0.0025W + 25 mm

(2) Level alignment

Profile grade	25 mm
Surface of invert	6 mm
Height of lining	0.005H + 25 mm

(3) Cross-sectional dimensions

Thickness of lining cross section: 10 percent specified thickness provided average thickness is maintained as determined by daily batch volumes.

TOLERANCES FOR SMALL HYDRAULIC STRUCTURES
TOLERANCES FOR SMALL HYDRAULIC STRUCTURES

(1) Vertical alignment

Exposed surfaces ..... 19 mm
Concealed surfaces ..... 40 mm

(2) Lateral alignment

Centerline alignment ..... 25 mm

(3) Cross-sectional dimensions

Members such as columns, beams,
piers, walls, and others
(slabs--thickness only) ..... +13 mm
..... -6 mm

Openings through concrete members ..... 13 mm

(4) Relative alignment

Location of openings
through concrete members ..... 13 mm

Formed surface slope with
respect to the specified plane

Watertight joints ..... 3 mm in 3000 mm
Other exposed surfaces ..... 13 mm in 3000 mm
Concealed surfaces ..... 25 mm in 3000 mm

Unformed exposed surfaces
slopes with respect to the
specified plane ..... 7 mm in 3000 mm
..... 10 mm in 6000 mm

TOLERANCES FOR CONDUITS AND CULVERTS

(1) Lateral alignment

Centerline alignment

Water conveying conduits,
and culverts ..... 13 mm

Inside dimensions ..... 0.005 times inside dimension

(2) Level alignment

Profile grade

Water conveying conduits,
and culverts ..... 13 mm

TOLERANCES FOR CONDUITS AND CULVERTS

Surface of invert ..... 6 mm

Surface of side slope ..... 13 mm

(3) Cross-sectional dimension

Thickness at any point

Conduits and Culverts..... +5 percent thickness but not less than 13 mm

..... -2.5 percent thickness but not less than 6 mm

1.5.2 Appearance

Permanently exposed surfaces shall be cleaned, if stained or otherwise discolored, by a method that does not harm the concrete and that is approved by the Contracting Officer.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

Cementitious materials shall be portland cement, portland cement in combination with pozzolan and shall conform to appropriate specifications listed below.

2.1.1.1 Portland Cement

ASTM C 150, Type V, Low alkali.

2.1.1.2 High-Early-Strength Portland Cement

ASTM C 150, Type III, with C_3A limited to 8 percent, low alkali. Type III cement shall be used only in isolated instances and only when specifically approved in writing by the Contracting Officer.

2.1.1.3 Pozzolan

Pozzolan shall conform to ASTM C 618, Class F, with the loss on ignition limited to 6 percent and the optional requirements for multiple factor, drying shrinkage, and uniformity of Table 2A.

2.1.2 Aggregates

2.1.2.1 General

Concrete aggregates may be furnished from any source capable of meeting the quality requirements as stated herein below. Fine and coarse aggregates shall conform to the grading requirements of ASTM C 33. The nominal maximum size shall be as listed in paragraph NOMINAL MAXIMUM-SIZE COARSE AGGREGATE. Where the use of highway department gradations are permitted, proposed gradations shall be submitted for approval.

2.1.2.2 Concrete Aggregate Sources

a. List of Sources - The concrete aggregates sources may be selected from the following existing sources:

Nevada Ready Mix	Lone Mountain Pit
CSR Materials	Buffalo Road Pit
Hanson Aggregates	Henderson

b. Selection of Source - After the award of the contract, the Contractor shall designate in writing only one source or combination of sources from which he proposes to furnish aggregates. If the Contractor proposes to furnish aggregates from a source or from sources not listed above, he may designate only a single source or single combination of sources for aggregates. Regardless of the source, selected samples for acceptance testing shall be provided as required by paragraph GOVERNMENT TESTING AND SAMPLING. If a source for coarse or fine aggregates so designated by the Contractor does not meet the quality requirements of ASTM C 33 and other applicable ASTM tests, the Contractor may not submit for approval other non-listed sources but shall furnish the coarse or fine aggregate, as the case may be, from sources listed above at no additional cost to the Government.

2.1.2.3 AGGREGATE SOURCES FOR TEST PURPOSES

Portions of the work will require aggregates from specific sources for test purposes. The tests will included use of the aggregates in planned construction as indicated on the drawings. Aggregates for use in the test sections will be obtained from one of the two following sources:

Barr Sand and Gravel	Glendale/Moapa, NV
Frehner Construction Quarry	Sloan, NV

2.1.3 Chemical Admixtures

Chemical admixtures to be used, when required or permitted, shall conform to the appropriate specification listed.

2.1.3.1 Air-Entraining Admixture

The air-entraining admixture shall conform to ASTM C 260 and shall consistently cause the concrete to have an air content in the specified ranges under field conditions.

2.1.3.2 Accelerating Admixture

Accelerators shall meet the requirements of ASTM C 494/C 494M, Type C or E, except that calcium chloride or admixtures containing calcium chloride shall not be used.

2.1.3.3 Water-Reducing or Retarding Admixture

a. Water-Reducing or Retarding Admixtures: ASTM C 494/C 494M, Type A, B, or D, except that the 6-month and 1-year compressive strength tests are waived.

b. High-Range Water Reducing Admixture: ASTM C 494/C 494M, Type F or G, except that the 6-month and 1-year strength requirements shall be waived. The admixture may be used only when approved by the Contracting Officer.

2.1.3.4 LITHIUM ADMXITURE

The Lithium admixture will be supplied by a manufacturer regularly engaged in the production of admixtures for use in concrete construction. The lithium admixture shall be a nominal 30 percent aqueous solution of LiNO3 with a density of 1.2 kilograms per liter, and shall have the approximate chemical form as shown below:

Constituent		Limit (Percent by Mass)
LiNO3	(Lithium Nitrate)	30% +/- 0.5%
SO4-2	(sulfate ion)	0.1% max
CL-	(chloride ion)	0.2% max
Na+	(sodium ion)	0.1% max
K+	(potassium ion)	0.1% max

2.1.4 Curing Materials

2.1.4.1 Impervious-Sheet Curing Materials

Impervious-sheet curing materials shall conform to ASTM C 171, type optional, except polyethylene film shall not be used.

2.1.4.2 Membrane-Forming Curing Compound

The membrane-forming curing compound shall conform to ASTM C 309, Type 2.

2.1.5 Water

Water for mixing and curing shall be fresh, clean, potable, and free of injurious amounts of oil, acid, salt, or alkali, except that nonpotable water may be used if it meets the requirements of COE CRD-C 400.

2.1.8 Latex Bonding Compound

Latex bonding compound agents for bonding fresh to hardened concrete shall conform to ASTM C 1059.

2.1.9 Epoxy Resin

Epoxy resin for use in repairs shall conform to ASTM C 881, Type III, Grade I or II.

2.1.8 Nonshrink Grout

Nonshrink grout shall conform to ASTM C 1107 and shall be a commercial formulation suitable for the application proposed. Grout strength shall be 31 MPa in 3 days.

2.1.9 JOINT MATERIALS

Expansion joint filler shall be a preformed material conforming to ASTM D 1751. Expansion joint filler shall be 20 mm thick.

2.1.10 DOWELS

Dowels shall be single piece, plain (non-deformed) steel bars conforming to ASTM A 615 Grade 60 or higher. Dowels shall be free of loose, flaky rust and loose scale and shall be clean and straight.

2.1.11 EPOXY RESIN FOR PAVEMENT REPAIRS

All epoxy-resin materials shall be two-component materials conforming to ASTM C 881, Class as appropriate for each application temperature to be encountered; except, that in addition, the materials shall meet the following requirements:

a. Material for use for embedding dowels and shall be Type IV, Grade 3.

b. Material for use as patching for complete filling of spalls, wide cracks, and other voids and for use in preparing epoxy resin mortar shall be Type III, Grade as approved.

c. Material for injecting cracks shall be Type IV, Grade 1.

d. Material for bonding freshly mixed portland cement concrete, mortar, or freshly mixed epoxy resin concrete to hardened concrete shall be Type V, Grade as approved.

2.2 CONCRETE MIXTURE PROPORTIONING

2.2.1 Quality of Mixture

For each portion of the structure, mixture proportions shall be selected so that the strength and W/C requirements listed in paragraph DESIGN REQUIREMENTS are met.

2.2.2 Nominal Maximum-Size Coarse Aggregate

Nominal maximum-size coarse aggregate shall be 37.5 mm except 19.0 mm nominal maximum-size coarse aggregate shall be used when any of the following conditions exist: the narrowest dimension between sides of forms is less than 190 mm, the depth of the slab is less than 100 mm, or the minimum clear spacing between reinforcing is less than 55 mm.

2.2.3 Air Content

Air content as delivered to the forms and as determined by ASTM C 231 shall be between 4 and 7 percent except when the nominal maximum size course aggregate is 19.0 mm, it should be between 4-1/2 and 7-1/2 percent.

2.2.4 Pozzolan

Pozzolan content shall be less than 30% of cementitious material.

2.2.5 Slump

The slump shall be determined in accordance with ASTM C 143/C 143M and shall be within the range of 25 mm to 100 mm. Where placement by pump is approved, the slump shall not exceed 150 mm.

2.2.6 Concrete Proportioning

Trial batches and testing requirements for various qualities of concrete specified shall be the responsibility of the Contractor. Samples of aggregates shall be obtained in accordance with the requirements of ASTM D 75. Samples of materials other than aggregate shall be representative of those proposed for the project and shall be accompanied by the manufacturer's test reports indicating compliance with applicable specified requirements. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1, using at least three different water-cement ratios, which will produce a range of strength encompassing those required for the work. The maximum water-cement ratios required in paragraph MAXIMUM WATER-CEMENT RATIO will be converted to a weight ratio of water to cement plus pozzolan by mass, as described in ACI 211.1. Trial mixtures shall be proportioned for maximum permitted slump and air content with due consideration to the approved conveying and placement method. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192/C 192M. They shall be tested at 7 days and at the design age specified in paragraph DESIGN REQUIREMENTS in accordance with ASTM C 39/C 39M. From these test results, a curve shall be plotted showing the relationship between water-cement ratio and strength.

2.2.7 Required Average Compressive Strength

In meeting the strength requirements specified in paragraph CONCRETE STRENGTH, the selected mixture proportion shall produce a required average compressive strength f'cr exceeding the specified strength f'c by the amount indicated below.

2.2.7.1 Average Compressive Strength from Test Records

Where a concrete production facility has test records, a standard deviation shall be established in accordance with the applicable provisions of ACI 214. Test records from which a standard deviation is calculated shall represent materials, quality control procedures, and conditions similar to those expected, shall represent concrete produced to meet a specified strength or strengths (f'c) within 7.0 MPa of that specified for proposed work, and shall consist of at least 30 consecutive tests. A strength test shall be the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days or at another test age designated for determination of f'c.

Required average compressive strength f'cr used as the basis for selection of concrete proportions shall be the larger of the equations that follow using the standard deviation as determined above:

$$f'cr = f'c + 1.34S$$
$$f'cr = f'c + 2.33S - 3.45$$

Where S = standard deviation

Where a concrete production facility does not have test records meeting the requirements above but does have a record based on 15 to 29 consecutive tests, a standard deviation shall be established as the product of the calculated standard deviation and a modification factor from the following table:

NUMBER OF TESTS*	MODIFICATION FACTOR FOR STANDARD DEVIATION Use tabulation in paragraph DETERMINING REQUIRED AVERAGE STRENGTH
less than 15	
15	1.16
20	1.08
25	1.03
30 or more	1.00

*Interpolate for intermediate numbers of tests.

2.2.7.2 Average Compressive Strength without Previous Test Records

When a concrete production facility does not have sufficient field strength test records for calculation of the standard deviation, the required average strength f 'cr shall be determined as follows:

If the specified compressive strength f'c is 20.7 to 34.5 MPa,

$$f'cr = f'c + 8.27$$

2.2.8 GOVERNMENT MIXTURE PROPORTIONING FOR CONCRETE WITH LITHIUM ADMIXTURE

2.2.8.1 Composition

Concrete shall be composed of cementitious materials, water, fine and coarse aggregates, and admixtures. The cementitious materials shall be portland cement and portland cement in combination with pozzolan. The admixtures shall be an air-entraining admixture, a WRA, and may contain a lithium based admixture No other chemical admixtures than those listed above shall be used.

2.2.8.2 Proportioning Responsibility

The concrete mixtures will be proportioned by the Contracting Officer.

2.2.8.3 Control

The proportions of all material entering into each concrete mixture will be furnished to the Contractor. The proportions will be changed by the Contracting Officer as necessary. Adjustments shall be made by the Contractor to the batch weights of aggregates and water as necessary to compensate for free moisture in the aggregates. The quantity of air-entrainment admixture shall be adjusted by the Contractor to maintain the specified air content.

2.2.8.4 Air Content

The air content by volume shall be determined by ASTM C 231. When the

nominal maximum size of coarse aggregate is 37.5 mm or larger, the air content of the sample measured in accordance with ASTM C 231 shall be 5-1/2 " 1-1/2 percent. When the nominal maximum-size coarse aggregate is 19 mm, the air content shall be 6 " 1 percent. The specified air content shall be present in the concrete when the concrete has been placed in the forms.

2.2.8.5 Slump

The slump shall be determined in accordance with ASTM C 143 and shall be 50 mm " 25 mm for massive features and between 25 and 100 mm for all others except where placement by pump is approved, in which case the slump shall be 114 mm " 38 mm. In addition, the range of each set of two consecutive tests for each mixture shall be not more than 50 mm. The above specified slump is that required at the forms.

PART 3 EXECUTION

3.1 EQUIPMENT

3.1.1 Capacity

The batching, mixing, conveying, and placing equipment shall have a capacity of at least 100 cubic meters per hour.

3.1.2 Batch Plant

Batch plant shall conform to the requirements of NRMCA CPMB 100and as specified; however, rating plates attached to batch plant equipment are not required.

3.1.2.1 Batching Equipment

The batching controls shall be semiautomatic. The semiautomatic batching system shall be provided with interlocks such that the discharge device cannot be actuated until the indicated material is within the applicable tolerance. The batching system shall be equipped with an accurate recorder or recorders that meet the requirements of NRMCA CPMB 100. Separate bins or compartments shall be provided for each size group of aggregate and cement and pozzolan. Aggregates shall be weighed either in separate weigh batchers with individual scales or cumulatively in one weigh batcher on one scale. Aggregate shall not be weighed in the same batcher with cement or pozzolan. If both cement and pozzolan are used, they may be batched cumulatively provided that the portland cement is batched first. If measured by mass, the mass of the water shall not be weighed cumulatively with another ingredient. Water batcher filling and discharging valves shall be so interlocked that the discharge valve cannot be opened before the filling valve is fully closed. An accurate mechanical device for measuring and dispensing each admixture shall be provided. Each dispenser shall be interlocked with the batching and discharging operation of the water so that each admixture is separately batched and discharged automatically in a manner to obtain uniform distribution throughout the batch in the specified mixing period. Admixtures shall not be combined prior to introduction in water. The plant shall be arranged so as to facilitate the inspection of all operations at all times. Suitable facilities shall be provided for obtaining representative samples of aggregates from each bin or compartment. All filling ports for cementitious materials bins or silos shall be clearly marked with a permanent sign stating the contents.

3.1.2.2 Scales

The equipment for batching by mass shall conform to the applicable requirements of NIST HB 44, except that the accuracy shall be plus or minus 0.2 percent of scale capacity. The Contractor shall provide standard test weights and any other auxiliary equipment required for checking the operating performance of each scale or other measuring devices. Tests shall be made at the frequency required in paragraph TESTS AND INSPECTIONS, and in the presence of a government inspector.

3.1.2.3 Batching Tolerances

a. Weighing Tolerances

MATERIAL	PERCENT OF REQUIRED MASS
Cementitious materials	0 to plus 2
Aggregate	plus or minus 2
Water	plus or minus 1
Chemical admixture	0 to plus 6

b. Volumetric Tolerances - For volumetric batching equipment, the following tolerances shall apply to the required volume of material being batched:

Water: ..... Plus or minus 1 percent.
Chemical admixtures: ..... Zero to plus 6 percent.

3.1.2.4 Moisture Control

The plant shall be capable of ready adjustment to compensate for the varying moisture content of the aggregates and to change the masses of the materials being batched. An electric moisture meter complying with the provisions of COE CRD-C 143 shall be provided for measuring moisture in the fine aggregate. The sensing element shall be arranged so that the measurement is made near the batcher charging gate of the sand bin or in the sand batcher.

3.1.3 Concrete Mixers

The concrete mixers shall not be charged in excess of the capacity recommended by the manufacturer. The mixers shall be operated at the drum or mixing blade speed designated by the manufacturer. The mixers shall be maintained in satisfactory operating condition, and the mixer drums shall be kept free of hardened concrete. Should any mixer at any time produce unsatisfactory results, its use shall be promptly discontinued until it is repaired.

3.1.3.1 Stationary Mixers

Concrete plant mixers shall be tilting, nontilting, horizontal-shaft, vertical-shaft, or pugmill and shall be provided with an acceptable device to lock the discharge mechanism until the required mixing time has elapsed. The mixing time and uniformity shall conform to all the requirements in ASTM C 94/C 94M applicable to central-mixed concrete.

3.1.3.2 Truck Mixers

Truck mixers, the mixing of concrete therein, and concrete uniformity shall conform to the requirements of ASTM C 94/C 94M. A truck mixer may be used either for complete mixing (transit-mixed) or to finish the partial mixing done in a stationary mixer (shrink-mixed). Each truck shall be equipped with two counters from which it will be possible to determine the number of revolutions at mixing speed and the number of revolutions at agitating speed.

3.1.4 Conveying Equipment

The conveying equipment shall conform to the following requirements.

3.1.4.1 Buckets

The interior hopper slope shall be not less than 58 degrees from the horizontal, the minimum dimension of the clear gate opening shall be at least five times the nominal maximum-size aggregate, and the area of the gate opening shall not be less than 0.2 square meter. The maximum dimension of the gate opening shall not be greater than twice the minimum dimension. The bucket gates shall be essentially grout tight when closed and may be manually, pneumatically, or hydraulically operated except that buckets larger than 1.5 cubic meters shall not be manually operated. The design of the bucket shall provide means for positive regulation of the amount and rate of deposit of concrete in each dumping position.

3.1.4.2 Transfer Hoppers

Concrete may be charged into nonagitating hoppers for transfer to other conveying devices. Transfer hoppers shall be capable of receiving concrete directly from delivery vehicles and have conical-shaped discharge features. The transfer hopper shall be equipped with a hydraulically operated gate and with a means of external vibration to effect complete discharge. Concrete shall not be held in nonagitating transfer hoppers more than 30 minutes.

3.1.4.3 Trucks

Truck mixers operating at agitating speed or truck agitators used for transporting plant-mixed concrete shall conform to the requirements of ASTM C 94/C 94M. Nonagitating equipment may be used for transporting plant-mixed concrete over a smooth road when the hauling time is less than 15 minutes. Bodies of nonagitating equipment shall be smooth, watertight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation, and equipped with gates that will permit positive control of the discharge of the concrete. Concrete for pavement construction shall be transported to the paving site in rear-dump trucks, in truck mixers designed with extra large blading and rear opening specifically for low slump concrete, or in agitators. Bottom-dump trucks shall not be used for delivery of concrete.

3.1.4.4 Chutes

When concrete can be placed directly from a truck mixer, agitator, or nonagitating equipment, the chutes attached to this equipment by the manufacturer may be used. A discharge deflector shall be used when

required by the Contracting Officer. Separate chutes and other similar equipment will not be permitted for conveying concrete.

3.1.4.5 Belt Conveyors

Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete at the transfer points and the point of placing. Belt conveyors shall be constructed such that the idler spacing shall not exceed 900 mm. The belt speed shall be a minimum of 90 m per minute and a maximum of 230 m per minute. If concrete is to be placed through installed horizontal or sloping reinforcing bars, the conveyor shall discharge concrete into a pipe or elephant trunk that is long enough to extend through the reinforcing bars.

3.1.4.6 Concrete Pumps

Concrete may be conveyed by positive displacement pump when approved. The pumping equipment shall be piston or squeeze pressure. The pipeline shall be rigid steel pipe or heavy-duty flexible hose. The inside diameter of the pipe shall be at least three times the nominal maximum-size coarse aggregate in the concrete mixture to be pumped but not less than 100 mm. Aluminum pipe shall not be used. The maximum-size coarse aggregate shall not be reduced to accommodate the pumps. The distance to be pumped shall not exceed limits recommended by the pump manufacturer. The concrete shall be supplied to the concrete pump continuously. When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place. After each operation, equipment shall be thoroughly cleaned, and flushing water shall be wasted outside of the forms.

3.1.5 Vibrators

Vibrators of the proper size, frequency, and amplitude shall be used for the type of work being performed in conformance with the following requirements:

APPLICATION	HEAD DIAMETER mm	FREQUENCY VPM	AMPLITUDE mm
General construction	50 to 88	8,000 to 12,000	0.6 to 1.2

The frequency and amplitude shall be determined in accordance with COE CRD-C 521.

3.1.6 Finishing Equipment

Bridge deck finishers may be used to finish concrete pavements. Clary screeds or other rotating tube floats will not be allowed on the project.

3.1.7 Sawing Equipment

Equipment for sawing joints and for other similar sawing of concrete shall be standard diamond-tip-bladed concrete saws mounted on a wheeled chassis.

3.1.8 Straightedge

The Contractor shall furnish and maintain at the job site one 4 m straightedge for testing concrete surface smoothness. The straightedge shall be constructed of aluminum or magnesium alloy and shall have blades of box or box-girder cross section with flat bottom, adequately reinforced to insure rigidity and accuracy. Straightedges shall have handles for operation on the pavement.

3.2 PREPARATION FOR PLACING

3.2.1 Embedded Items

Before placement of concrete, care shall be taken to determine that all embedded items are firmly and securely fastened in place as indicated on the drawings, or required. Embedded items shall be free of oil and other foreign matter such as loose coatings or rust, paint, and scale. The embedding of wood in concrete will be permitted only when specifically authorized or directed. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into voids. Welding, including tack welding, will not be permitted on embedded metals within 600 mm of the surface of the concrete.

3.2.2 Concrete on Earth Foundations

Earth surfaces upon which concrete is to be placed shall be clean, damp, and free from debris, frost, ice, and standing or running water. Prior to placement of concrete, the earth foundation shall have been satisfactorily compacted in accordance with Section 02250 FILLS AND SUBGRADE PREPARATION. Additionally, the foundation shall be inspected by the Contractor prior to concrete placement in order to certify that it is ready to receive concrete. The results of each inspection shall be submitted in writing.

3.2.3 Concrete on Rock Foundations

Rock surfaces upon which concrete is to be placed shall be clean, free from oil, standing or running water, ice, mud, drummy rock, coating, debris, and loose, semidetached, or unsound fragments. Joints in rock shall be cleaned to a satisfactory depth, as determined by the Contracting Officer, and to firm rock on the sides. Immediately before the concrete is placed, all rock surfaces shall be cleaned thoroughly by the use of air-water jets or sandblasting as described in paragraph CONSTRUCTION JOINT TREATMENT. All rock surfaces shall be kept continuously wet for at least 24 hours immediately prior to placing concrete thereon. All approximately horizontal surfaces shall be covered, immediately before the concrete is placed, with a layer of mortar proportioned similar to that in the concrete mixture. The mortar shall be covered with concrete before the time of initial setting of the mortar.

3.2.4 Construction Joint Treatment

Construction joint treatment shall conform to the following requirements.

3.2.4.1 Joint Preparation

Concrete surfaces to which additional concrete is to be bonded shall be prepared for receiving the next lift or adjacent concrete by cleaning with either air-water cutting, sandblasting, high-pressure water jet, or other approved method. Air-water cutting will not be permitted on formed

surfaces or surfaces congested with reinforcing steel. Regardless of the method used, the resulting surfaces shall be free from all laitance and inferior concrete so that clean, well bonded coarse aggregate is exposed uniformly throughout the lift surface. The edges of the coarse aggregate shall not be undercut. The surface shall be washed clean again as the last operation prior to placing the next lift. There shall be no standing water on the surface upon which concrete is placed.

3.2.4.2 Air-Water Cutting

Air-water cutting of a construction joint shall be performed at the proper time and only on horizontal construction joints. The air pressure used in the jet shall be 620 to 760 kPa, and the water pressure shall be just sufficient to bring the water into effective influence of the air pressure. When approved by the Contracting Officer, a retarder complying with the requirements of COE CRD-C 94 may be applied to the surface of the lift to prolong the period of time during which air-water cutting is effective. Prior to receiving approval, the Contractor shall furnish samples of the material to be used and shall demonstrate the method to be used in applications. After cutting, the surface shall be washed and rinsed as long as there is any trace of cloudiness of the wash water. Where necessary to remove accumulated laitance, coatings, stains, debris, and other foreign material, high-pressure water jet or sandblasting will be required as the last operation before placing the next lift.

3.2.4.3 High-Pressure Water Jet

A stream of water under a pressure of not less than 20 MPa may be used for cleaning. Its use shall be delayed until the concrete is sufficiently hard so that only the surface skin or mortar is removed and there is no undercutting of coarse-aggregate particles. If the water jet is incapable of a satisfactory cleaning, the surface shall be cleaned by sandblasting.

3.2.4.4 Wet Sandblasting

This method may be used when the concrete has reached sufficient strength to prevent undercutting of the coarse aggregate particles. The surface of the concrete shall then be washed thoroughly to remove all loose materials.

3.2.4.5 Waste Disposal

The method used in disposing of waste water employed in cutting, washing, and rinsing of concrete surfaces shall be such that the waste water does not stain, discolor, or affect exposed surfaces of the structures, or damage the environment of the project area. The method of disposal shall be subject to approval.

3.3 PLACING

3.3.1 Placing Procedures

The surfaces of horizontal construction joints shall be kept continuously wet for the first 12 hours during the 24-hour period prior to placing concrete. Surfaces shall be dampened immediately before placement as necessary. Concrete placement will not be permitted when, in the opinion of the Contracting Officer, weather conditions prevent proper placement and consolidation. Concrete shall be deposited as close as possible to its

final position in the forms and, in so depositing, there shall be no vertical drop greater than 1.5 m except where suitable equipment is provided to prevent segregation and where specifically authorized. Depositing of the concrete shall be so regulated that it may be effectively consolidated in horizontal layers 600 mm or less in thickness with a minimum of lateral movement. The amount deposited in each location shall be that which can be readily and thoroughly consolidated. Sufficient placing capacity shall be provided so that concrete placement can be kept plastic and free of cold joints while concrete is being placed. Concrete shall be placed by methods that will prevent segregation or loss of ingredients. Any concrete transferred from one conveying device to another shall be passed through a hopper that is conical in shape. The concrete shall not be dropped vertically more than 1.5 m, except where a properly designed and sized elephant truck with rigid drop chute bottom section is provided to prevent segregation and where specifically authorized. In no case will concrete be discharged to free-fall through reinforcing bars.

3.3.2 Placement by Pump

When concrete is to be placed by pump, the nominal maximum-size coarse aggregate shall not be reduced to accommodate the pumps. The distance to be pumped shall not exceed limits recommended by the pump manufacturer. The concrete shall be supplied to the concrete pump continuously. When pumping is completed, concrete remaining in the pipeline shall be ejected without contamination of concrete in place. After each operation, equipment shall be thoroughly cleaned, and flushing water shall be wasted outside of the forms. Grout used to lubricate the pumping equipment at the beginning of the placement will not be incorporated into the placement.

3.3.3 Time Interval Between Mixing and Placing

Concrete shall be placed within 30 minutes after discharge into nonagitating equipment. When concrete is truck-mixed or when a truck mixer or agitator is used for transporting concrete mixed by a concrete plant mixer, the concrete shall be delivered to the site of the work, and discharge shall be completed within 1-1/2 hours after introduction of the cement to the aggregates. When the length of haul makes it impossible to deliver truck-mixed concrete within these time limits, batching of cement and a portion of the mixing water shall be delayed until the truck mixer is at or near the construction site. For concrete pavement construction, concrete shall be deposited in the forms within 45 minutes from the time cement has been charged into the mixing drum, except that if the ambient temperature is above 32 degrees C, the time shall be reduced to 30 minutes.

3.3.4 Cold-Weather Placing

When cold-weather placing of concrete is likely to be subjected to freezing temperatures before the expiration of the curing period, it shall be placed in accordance with procedures previously submitted in accordance with paragraph SUBMITTALS. The ambient temperature of the space adjacent to the concrete placement and surfaces to receive concrete shall be above 0 degrees C. The placing temperature of the concrete having a minimum dimension less than 300 mm shall be between 12 and 24 degrees C when measured in accordance with ASTM C 1064/C 1064M. The placing temperature of the concrete having a minimum dimension greater than 300 mm shall be between 10 and 20 degrees C. Heating of the mixing water or aggregates will be required to regulate the concrete-placing temperatures. Materials entering the mixer shall be free from ice, snow, or frozen lumps. Salt,

chemicals, or other materials shall not be mixed with the concrete to prevent freezing.

3.3.5 Hot-Weather Placing

Concrete shall be properly placed and finished with procedures previously submitted in accordance with paragraph SUBMITTALS. The concrete-placing temperature shall not exceed 30 degrees C when measured in accordance with ASTM C 1064/C 1064M. Cooling of the mixing water and aggregates, or both, may be required to obtain an adequate placing temperature. A retarder meeting the requirements of paragraph WATER-REDUCING OR RETARDING ADMIXTURES may be used to facilitate placing and finishing. Steel forms and reinforcement shall be cooled prior to concrete placement when steel temperatures are greater than 50 degrees C. Conveying and placing equipment shall be cooled if necessary to maintain proper concrete-placing temperature.

3.3.6 Consolidation

Immediately after placement, each layer of concrete, including flowing concrete, shall be consolidated by internal vibrating equipment. Vibrators shall not be used to transport concrete within the forms. Hand spading may be required, if necessary, with internal vibrating along formed surfaces permanently exposed to view. Form or surface vibrators shall not be used unless specifically approved. The vibrator shall be inserted vertically at uniform spacing over the entire area of placement. The distance between insertions shall be approximately 1-1/2 times the radius of action of the vibrator. The vibrator shall penetrate rapidly to the bottom of the layer and at least 150 mm into the preceding unhardened layer if such exists. It shall be held stationary until the concrete is consolidated and then withdrawn slowly.

3.4 FINISHING

The ambient temperature of spaces adjacent to surfaces being finished shall be not less than 5 degrees C. In hot weather when the rate of evaporation of surface moisture, as determined by use of Figure 2.1.5 of ACI 305R, may reasonably be expected to exceed 1.0 kilogram per square meter per hour. Provisions for windbreaks, shading, fog spraying, or wet covering with a light-colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as finishing operations will allow. All unformed surfaces that are not to be covered by additional concrete or backfill shall have a float finish. Additional finishing shall be as specified below and shall be true to the elevation shown in the drawings. Surfaces to receive additional concrete or backfill shall be brought to the elevation shown on the drawings and left true and regular. Exterior surfaces shall be sloped for drainage unless otherwise shown in the drawing or as directed. Joints shall be carefully made with a jointing or edging tool. The finished surfaces shall be protected from stains or abrasions. Grate tampers or jitterbugs shall not be used.

3.4.1 Unformed Surfaces

3.4.1.1 Float Finish

Surfaces shall be screeded and darbied or bullfloated to bring the surface to the required finish level with no coarse aggregate visible. No water, cement, or mortar shall be added to the surface during the finishing

operation. The concrete, while still green but sufficiently hardened to bear a man's weight without deep imprint, shall be floated to a true and even plane. Floating may be performed by use of suitable hand floats or power-driven equipment. Hand floats shall be made of magnesium or aluminum. Roof slabs to be buried shall receive a float finish.

3.4.1.2 Trowel Finish

A trowel finish shall be applied to the top of channel walls, and as indicated on the drawings. Concrete surfaces shall be finished with a float finish, and after surface moisture has disappeared, the surface shall be troweled to a smooth, even, dense finish free from blemishes including trowel marks.

3.4.1.4 Broom Finish

A broom finish shall be applied to the face and surfaces of concrete channel inverts, and sidewalls. The concrete surface shall be screeded and floated finish plane with no coarse aggregate visible. After surface moisture disappears, the surface shall be broomed or brushed screeded and fine hair-broom or fiber bristle brushed in a direction transverse to that of the channel centerline for all invert side slope areas, or as directed.

3.4.2 Formed Surfaces

Unless another finish is specified, surfaces shall be left with the texture imparted by the forms except that defective surfaces shall be repaired as described in paragraph FORMED SURFACE REPAIR. Uniform color of the concrete shall be maintained by use of only one mixture without changes in materials or proportions for any structure or portion of structure that is exposed to view. The form panels used to produce the finish shall be orderly in arrangement. Forms shall not be reused if there is any evidence of surface wear or defects that would impair the quality of the surface.

3.4.3 Formed Surface Repair

After removal of forms, all ridges, lips, and bulges on surfaces permanently exposed shall be removed. All repairs shall be completed within 48 hours after form removal.

3.4.3.1 Classes A, B Finishes

Surfaces listed in Section 03101 FORMWORK FOR CONCRETE and as shown to have classes A, and B finishes shall have surface defects repaired as follows: defective areas, voids, and honeycombs smaller than 10,000 square millimeters in area and less than 13 mm deep and bug holes exceeding 13 mm in diameter shall be chipped and filled with dry-packed mortar. Holes left by removal of tie rods shall be reamed and filled with dry-packed mortar as specified in paragraph MATERIAL AND PROCEDURE FOR REPAIRS. Defective and unsound concrete areas larger than described shall be defined by 13 mm deep dovetailed saw cuts in a rectangular pattern with lines parallel to the formwork, the defective concrete removed by chipping, and the void repaired with replacement concrete. The prepared area shall be brush-coated with an epoxy resin meeting the requirements of paragraph EPOXY RESIN, a latex bonding agent meeting the requirements of paragraph LATEX BONDING COMPOUND, or a neat cement grout after dampening the area with water. The void shall be filled with replacement concrete in accordance with paragraph MATERIAL AND PROCEDURE FOR REPAIRS.

3.4.3.3 Class D Finish

Surfaces listed in Section 03101 FORMWORK FOR CONCRETE and as shown to have class D finish shall have surface defects repaired as follows: defective areas, voids, and honeycombs greater than 30,000 square millimeters in area or more than 50 mm 2 inches deep shall be defined by 13 mm deep dovetailed saw cuts in a rectangular pattern, the defective concrete removed by chipping and the void repaired with replacement concrete. The prepared area shall be brush-coated with an epoxy resin meeting the requirements of paragraph EPOXY RESIN, a latex bonding agent meeting the requirements of paragraph LATEX BONDING COMPOUND, or a neat cement grout after dampening the area with water. The void shall be filled with replacement concrete in accordance with paragraph MATERIAL AND PROCEDURE FOR REPAIRS.

3.4.3.4 Material and Procedure for Repairs

The cement used in the dry-packed mortar or replacement concrete shall be a blend of the cement used for production of project concrete and white portland cement properly proportioned so that the final color of the mortar or concrete will match adjacent concrete. Trial batches shall be used to determine the proportions required to match colors. Dry-packed mortar shall consist of one part cement to two and one-half parts fine aggregate. The fine aggregate shall be that used for production of project concrete. The mortar shall be remixed over a period of at least 30 minutes without addition of water until it obtains the stiffest consistency that will permit placing. Mortar shall be thoroughly compacted into the prepared void by tamping, rodding, ramming, etc. and struck off to match adjacent concrete. Replacement concrete shall be produced using project materials and shall be proportioned by the Contracting Officer. It shall be thoroughly compacted into the prepared void by internal vibration, tamping, rodding, ramming, etc. and shall be struck off and finished to match adjacent concrete. Forms shall be used to confine the concrete. If an expanding agent is used in the repair concrete, the repair shall be thoroughly confined on all sides including the top surface. Metal tools shall not be used to finish permanently exposed surfaces. The repaired areas shall be cured for 7 days. The temperature of the in situ concrete, adjacent air, and replacement mortar or concrete shall be above 5 degrees C 40 degrees F during placement, finishing, and curing. Other methods and materials for repair may be used only when approved in writing by the Contracting Officer. Repairs of the so called "plaster-type" will not be permitted.

3.4.4 FINISHING OF PAVEMENTS

Clary screeds, "bridge deck" finishers, or other rotating pipe or tube type equipment shall not be permitted. The sequence of machine operations shall be transverse finishing, longitudinal machine floating if used, straightedge finishing, texturing, and then edging of joints. Hand finishing shall be used only infrequently and only on isolated areas of odd slab shapes and in the event of a breakdown of the mechanical finishing equipment. Supplemental hand finishing for machine finished pavement shall be kept to an absolute minimum. Equipment to be used for supplemental hand finishing shall primarily be 3 to 4 m cutting straightedges; only very sparing use of bull floats shall be allowed. At no time shall water be added to the surface of the slab in any way, except for fog (mist) sprays to prevent plastic shrinkage cracking.

3.4.4.1 Machine Finishing With Fixed Forms

The machine shall be designed to ride the forms. Machines that cause displacement of the forms shall be replaced. The machine shall make only one pass over each area of pavement. If the equipment and procedures do not produce a surface of uniform texture, true to grade, in one pass, the operation shall be immediately stopped and the equipment, mixture, and procedures adjusted as necessary.

3.4.4.2 Surface Correction

While the concrete is still plastic, irregularities and marks in the pavement surface shall be eliminated by means of cutting straightedges, 3 to 4 m 10 to 12 feet in length. Depressions shall be filled with freshly mixed concrete, struck off, consolidated, and refinished. Projections above the required elevation shall also be struck off and refinished. Long-handled, flat "bull floats" shall be used sparingly and only as necessary to correct minor, scattered surface defects. Finishing with hand floats and trowels shall be held to the absolute minimum necessary. Joints and edges shall not be overfinished.

3.4.4.3 Hand Finishing

Hand finishing operations shall be used only for those unusual slabs as specified previously. Grate tampers (jitterbugs) shall not be used. As soon as placed and vibrated, the concrete shall be struck off and screeded. The surface shall be tamped with a strike-off and tamping screed, or vibratory screed. Immediately following the final tamping of the surface, the pavement shall be floated longitudinally. Long-handled, flat bull floats shall be used sparingly and only as necessary to correct surface defects. Finishing with hand floats and trowels shall be held to the absolute minimum necessary. Joints and edges shall not be overfinished. No water shall be added to the pavement during finishing operations.

3.4.4.4 Texturing

Before the surface sheen has disappeared and before the concrete hardens, the surface of the pavement shall be given a texture as described hereafter. After curing is complete, all textured surfaces shall be thoroughly power broomed to remove all debris. The concrete in areas of recesses for tie-down anchors, lighting fixtures, and other outlets in the pavement shall be finished to provide a surface of the same texture as the surrounding area. Surface texture shall be applied using a mechanical stiff bristle broom drag of a type that will uniformly score the surface transverse to the pavement center line. The broom shall be capable of traversing the full width of the pavement in a single pass at a uniform speed and with a uniform pressure. Successive passes of the broom shall be overlapped the minimum necessary to obtain a uniformly textured surface. The scores should be uniform in appearance and approximately 1.5 mm in depth but not more than 3 mm in depth. Hand brooming will be permitted only on isolated odd shaped slabs or slabs where hand finishing is permitted.

3.4.4.5 Edging

After texturing has been completed, the edge of the slabs along the forms shall be carefully finished with an edging tool to form a smooth rounded surface of 3 mm radius. No water shall be added to the surface during edging.

3.5 CONCRETE PAVING

Pavement shall be constructed with paving and finishing equipment utilizing fixed forms.

3.5.1 Consolidation

Vibrators shall be inserted into the concrete not closer to the underlying material than 50 mm. The vibrators or any tamping units in front of the paver shall be automatically controlled so that they shall be stopped immediately as forward motion ceases. Excessive vibration shall not be permitted. Concrete in small, odd-shaped slabs or in locations inaccessible to the paver mounted vibration equipment shall be vibrated with a hand-operated immersion vibrator. Vibrators shall not be used to transport or spread the concrete.

3.5.2 Fixed Form Paving

Forms shall be steel, except that wood forms may be used for curves having a radius of 45 m or less, and for fillets. Forms may be built up with metal or wood, added only to the base, to provide an increase in depth of not more than 25 percent. The base width of the form shall be not less than eight-tenths of the vertical height of the form, except that forms 200 mm or less in vertical height shall have a base width not less than the vertical height of the form. Wood forms for curves and fillets shall be adequate in strength and rigidly braced. Forms shall be set on firm material cut true to grade so that each form section when placed will be firmly in contact with the underlying layer for its entire base. Forms shall not be set on blocks or on built-up spots of underlying material. Forms shall remain in place at least 12 hours after the concrete has been placed. Forms shall be removed without injuring the concrete. All equipment and its operation shall produce a finished surface requiring no hand finishing, other than the use of cutting straightedges, except in very infrequent instances. No water, other than true fog sprays (mist), shall be applied to the concrete surface during paving and finishing.

3.5.3 Placing Dowels

Dowels shall be installed with alignment not greater than 1 mm per 100 mm. Except as otherwise specified below, location of dowels shall be within a horizontal tolerance of plus or minus 15 mm and a vertical tolerance of plus or minus 5 mm. The portion of each dowel intended to move within the concrete or expansion cap shall be painted with one coat of rust inhibiting primer paint, and then oiled just prior to placement. Dowels in joints shall be omitted when the center of the dowel is located within a horizontal distance from an intersecting joint equal to or less than one-fourth of the slab thickness. Installation of dowels shall be by the bonded-in-place method, supported by means of devices fastened to the forms. Installation by removing and replacing in preformed holes will not be permitted.

3.5.3.1 Contraction Joints

Dowels in longitudinal contraction joints within the paving lane shall be held in place by means of rigid metal basket assemblies. The dowels shall be welded to the assembly or held firmly by mechanical locking arrangements that will prevent them from becoming distorted during paving operations. The basket assemblies shall be held securely in the proper location by

means of suitable anchors.

3.5.3.2 Construction Joints-Fixed Form Paving

Installation of dowels shall be by the bonded-in-place method, supported by means of devices fastened to the forms. Installation by removing and replacing in preformed holes will not be permitted.

3.6 JOINTS FOR PAVEMENTS

No deviation from the jointing pattern shown on the drawings shall be made without written approval of the Design District Pavement or Geotechnical Engineer. All joints shall be straight, perpendicular to the finished grade of the pavement, and continuous from edge to edge or end to end of the pavement with no abrupt offset and no gradual deviation greater than 13 mm.

3.6.1 Transverse Construction Joints

No transverse construction joints are planned. Transverse construction joints which occur as a result of the contractor=s activities shall be doweled and shall additionally be treated as follows. Transverse construction joints shall be installed at a planned transverse joint, at the end of each day's placing operations and when concrete placement is interrupted. Transverse construction joints shall be constructed either by utilizing headers and hand placement and finishing techniques, or by placing concrete beyond the transverse construction joint location and then saw cutting full depth and removing concrete back to the transverse construction joint location. All transverse construction joints shall be doweled.

3.6.2 Expansion Joints

Expansion joints shall be formed where indicated, and about any structures and features that project through or into the pavement, using preformed joint filler of the type, thickness, and width indicated, and shall extend the full slab depth. Edges of the concrete at the joint face shall be edged. The joint filler strips shall be installed to form a recess at the pavement surface to be filled with joint sealant.

3.6.3 Contraction Joints

Transverse and longitudinal contraction joints shall be of the weakened-plane or dummy type. Longitudinal contraction joints shall be constructed by sawing a groove in the hardened concrete with a power-driven saw. Transverse contraction joints shall be constructed in conformance with requirements for sawed joints. Sawed contraction joints shall be constructed by sawing a groove in the concrete with a 3 mm blade to the indicated depth. The time of initial sawing shall vary depending on existing and anticipated weather conditions and shall be such as to prevent uncontrolled cracking of the pavement. Sawing of the joints shall commence as soon as the concrete has hardened sufficiently to permit cutting the concrete without chipping, spalling, or tearing. The joints shall be sawed at the required spacing consecutively in the sequence of the concrete placement. Sawing at a given joint location shall be discontinued when a crack develops ahead of the saw cut. Immediately after the joint is sawed, the saw cut and adjacent concrete surface shall be thoroughly flushed with water until all waste from sawing is removed from the joint. The surface

shall be resprayed with curing compound as soon as free water disappears. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed with cord or backer rod before the concrete in the region of the joint is resprayed with curing compound.

3.6.4 Thickened Edge Joints

Underlying material in the transition area shall meet the requirements for smoothness and compaction specified for all other areas of the underlying material.

3.7 REPAIR, REMOVAL, AND REPLACEMENT OF SLABS

New pavement slabs that contain full-depth cracks shall be removed and replaced, as specified herein at no cost to the Government. Removal and replacement shall be full depth, shall be full width of the paving lane, and the limit of removal shall be from each original transverse joint. The Contracting Officer will determine whether cracks extend full depth of the pavement and may require minimum 150 mm diameter cores to be drilled on the crack to determine depth of cracking. Cores shall be drilled and the hole later filled by the Contractor with a well consolidated concrete mixture bonded to the walls of the hole with epoxy resin. Drilling of cores and refilling holes shall be at no expense to the Government. Cracks that do not extend full depth of slab shall be cleaned and then pressure injected with epoxy resin, Type IV, Grade 1. The Contractor shall ensure that the crack is not widened during epoxy resin injection. Where a full depth crack intersects the original transverse joint, the slab(s) containing the crack shall be removed and replaced, with dowels installed, as required below. Spalls along joints shall be repaired as specified.

3.7.1 Removal and Replacement of Full Slabs

Unless there are dowels present, all edges of the slab shall be sawcut full depth. If dowels, are present along any edges, these edges shall be sawed full depth 150 mm from the edge if only keys are present, or just beyond the end of dowels if they are present. These joints shall then be carefully sawed on the joint line to within 25 mm of the depth of the dowel or key. The main slab shall be further divided by sawing full depth, at appropriate locations, and each piece lifted out and removed. The narrow strips along keyed or doweled edges shall be carefully broken up and removed. Care shall be taken to prevent damage to the dowels or keys or to concrete to remain in place. Protruding portions of dowels shall be painted and lightly oiled. The joint face below keys or dowels shall be suitably trimmed so that there is no abrupt offset. If underbreak occurs at any point along any edge, the area shall be hand-filled with concrete, producing an even joint face from top to bottom, before replacing the removed slab. If underbreak over 100 mm deep occurs, the entire slab containing the underbreak shall be removed and replaced. Where there are no dowels on an edge, or where they have been damaged, dowels of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete. Original damaged dowels or tie bars shall be cut off flush with the joint face. All four edges of the new slab shall thus contain dowels or original keys or original tie bars. Prior to placement of new concrete, the underlying material shall be graded and recompacted, and the surfaces of all four joint faces shall be cleaned of all loose material and contaminants, and coated with a double application of membrane forming curing compound as bond breaker. Placement of concrete shall be as

specified for original construction. The resulting joints around the new slab shall be prepared and sealed as specified.

3.7.2 Repairing Spalls Along Joints

Spalls along joints and cracks shall be repaired by first making a vertical saw cut at least 25 mm outside the spalled area and to a depth of at least 50 mm. Saw cuts shall be straight lines forming rectangular areas. The concrete between the saw cut and the joint, or crack, shall be chipped out to remove all unsound concrete. The cavity shall be thoroughly cleaned with high pressure water jets supplemented with compressed air to remove all loose material. Immediately before filling the cavity, a prime coat shall be applied to the dry cleaned surface of all sides and bottom of the cavity, except any joint face. The prime coat shall be applied in a thin coating and scrubbed into the surface with a stiff-bristle brush. Prime coat for portland cement repairs shall be a neat cement grout and for epoxy resin repairs shall be epoxy resin, Type III, Grade 1. The cavity shall be filled with low slump portland cement concrete or mortar, or with epoxy resin concrete or mortar. Portland cement concrete shall be used for larger spalls, those more than 0.009 cubic meter in size after removal operations; portland cement mortar shall be used for spalls between 0.00085 and 0.009 cubic meter; and epoxy resin mortar or Type III, Grade 3 epoxy resin for those spalls less than 0.00085 cubic meter in size after removal operations. Portland cement concretes and mortars shall be very low slump mixtures, proportioned, mixed, placed, tamped, and cured. Epoxy resin mortars shall be made with Type III, Grade 1, epoxy resin, using proportions, mixing, placing, tamping and curing procedures as recommended by the manufacturer. Any repair material on the surrounding surfaces of the existing concrete shall be removed before it hardens. Where the spalled area abuts a joint, an insert or other bond-breaking medium shall be used to prevent bond at the joint face. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints. In lieu of sawing, spalls not adjacent to joints, and popouts, both less than 150 mm in maximum dimension, may be prepared by drilling a core 50 mm in diameter greater than the size of the defect, centered over the defect, and 50 mm deep or 13 mm into sound concrete, whichever is greater. The core hole shall be repaired as specified above for other spalls.

3.7.3 Areas Defective in Plan Grade or Smoothness

In areas not meeting the specified limits for surface smoothness and plan grade, high areas shall be reduced to attain the required smoothness and grade, except as depth is limited below. High areas shall be reduced by grinding the hardened concrete with a surface grinding machine after the concrete is 14 days or more old. The depth of grinding shall not exceed 6 mm. All pavement areas requiring plan grade or surface smoothness corrections in excess of the specified limits, shall be removed and replaced. In pavement areas given a wire comb or tined texture, areas exceeding 2 square meters that have been corrected by rubbing or grinding shall be retextured by grooving machine sawn grooves meeting the requirements for the wire comb or tined texture. All areas in which grinding has been performed will be subject to the thickness tolerances specified in paragraph Thickness. Any grinding performed on individual slabs with excessive deficiencies shall be performed at the Contractor's own decision without entitlement to additional compensation if eventual removal of the slab is required.

3.8 CURING AND PROTECTION

3.8.1 Duration

All concrete shall be cured by an approved method for a period of 7 days.

Immediately after placement, concrete shall be protected from premature drying, extremes in temperatures, rapid temperature change, and mechanical damage. All materials and equipment needed for adequate curing and protection shall be available and at the placement site prior to the start of concrete placement. Concrete shall be protected from the damaging effects of rain for 12 hours and from flowing water for 14 days. No fire or excessive heat including welding shall be permitted near or in direct contact with concrete or concrete embedments at any time.

3.8.2 Moist Curing

Moist-cured concrete shall be maintained continuously, not periodically, wet for the entire curing period. If water or curing materials stain or discolor concrete surfaces that are to be permanently exposed, they shall be cleaned as required in paragraph APPEARANCE. Where wooden form sheathing is left in place during curing, the sheathing shall be kept wet at all times. Where steel forms are left in place during curing, the forms shall be carefully broken loose from the hardened concrete and curing water continuously applied into the void so as to continuously saturate the entire concrete surface. Horizontal surfaces may be moist cured by ponding, by covering with a minimum uniform thickness of 50 mm of continuously saturated sand, or by covering with saturated nonstaining burlap or cotton mats. Horizontal construction joints may be allowed to dry for 12 hours immediately prior to the placing of the following lift.

3.8.3 Membrane-Forming Curing Compound

Concrete may be cured with an approved membrane-forming curing compound in lieu of moist curing except that membrane curing will not be permitted on any surface containing protruding steel reinforcement.

3.8.3.1 Application

The curing compound shall be applied to formed surfaces immediately after the forms are removed and prior to any patching or other surface treatment except the cleaning of loose sand, mortar, and debris from the surface. The surfaces shall be thoroughly moistened with water, and the curing compound applied as soon as free water disappears. The curing compound shall be applied to unformed surfaces as soon as free water has disappeared and bleeding has stopped. The curing compound shall be applied in a two-coat continuous operation by approved motorized power-spraying equipment operating at a minimum pressure of 500 kPa, at a uniform coverage of not more than 5 square meters per liter for each coat, and the second coat shall be applied perpendicular to the first coat. Concrete surfaces that have been subjected to rainfall within 3 hours after curing compound has been applied shall be resprayed by the method and at the coverage specified. All concrete surfaces on which the curing compound has been applied shall be adequately protected for the duration of the entire curing period from pedestrian and vehicular traffic and from any other cause that will disrupt the continuity of the curing membrane. During hot weather with low humidity and/or wind, the Contractor shall institute measures to prevent plastic shrinkage cracks from developing. ACI 305R contains means of predicting plastic shrinkage cracking and preventative measures. Plastic shrinkage cracks that occur shall be filled by injection of epoxy

resin after the concrete hardens. Plastic shrinkage cracks shall never be troweled over or filled with slurry.

3.8.4 Evaporation Retardant

Any horizontal concrete surface may be cured using sheet material. All surfaces shall be thoroughly wetted and be completely covered with waterproof paper or polyethylene-coated burlap having the burlap thoroughly water-saturated before placing. Covering shall be laid with light-colored side up. Covering shall be lapped not less than 300 mm and securely weighted down or shall be lapped not less than 100 mm and taped to form a continuous cover with completely closed joints. The sheet shall be weighted to prevent displacement so that it remains in contact with the concrete during the specified length of curing. Coverings shall be folded down over exposed edges of slabs and secured by approved means. Sheets shall be immediately repaired or replaced if tears or holes appear during the curing period.

3.8.5 Cold-Weather Curing and Protection

When the daily outdoor low temperature is less than 0 degrees C, the temperature of the concrete shall be maintained above 5 degrees C for the first 7 days after placing. In addition, during the period of protection removal, the air temperature adjacent to the concrete surfaces shall be controlled so that concrete near the surface will not be subjected to a temperature differential of more than 15 degrees C as determined by observation of ambient and concrete temperatures indicated by suitable temperatures measuring devices furnished by the Government as required and installed adjacent to the concrete surface and 50 mm inside the surface of the concrete. The installation of the thermometers shall be made by the Contractor at such locations as may be directed. Curing compounds shall not be used on concrete surfaces that are maintained at curing temperature by use of free steam.

3.8.6 Nonshrink Grout Application

Nonshrink grout shall conform to the requirements of paragraph NONSHRINK GROUT. Water content shall be the minimum that will provide a flowable mixture and fill the space to be grouted without segregation, bleeding, or reduction of strength. Mixing and placing shall be in conformance with the material manufacturer's instructions and as specified.

3.9 TESTS AND INSPECTIONS

Tests and inspections shall conform to the following requirements.

3.9.1 General

The Contractor shall perform the inspections and tests described below, and, based upon the results of these inspections and tests, he shall take the action required and submit reports as required. When, in the opinion of the Contracting Officer, the concreting operation is out of control, concrete placement shall cease. The laboratory performing the tests shall be on site and shall conform with ASTM C 1077. The individuals who sample and test concrete or the constituents of concrete as required in this specification shall have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I.

3.9.2 Testing and Inspection Requirements

3.9.2.1 Fine Aggregate

a. Grading - At least once during each shift when the concrete plant is operating, there shall be one sieve analysis and fineness modulus determination in accordance with ASTM C 136 and COE CRD-C 104 for the fine aggregate or for each size range of fine aggregate if it is batched in more than one size or classification. The location at which samples are taken may be selected by the Contractor as the most advantageous for control. However, the Contractor is responsible for delivering fine aggregate to the mixer within specification limits. Results of tests shall be reported in writing.

b. Corrective Action for Fine Aggregate Grading - When the amount passing on any sieve is outside the specification limits, the fine aggregate shall be immediately resampled and retested. If there is another failure on any sieve, the fact shall immediately be reported to the Contracting Officer.

c. Moisture Content Testing - When in the opinion of the Contracting Officer the electric moisture meter is not operating satisfactorily, there shall be at least four tests for moisture content in accordance with ASTM C 566 during each 8-hour period of mixing plant operation. The times for the tests shall be selected randomly within the 8-hour period. An additional test shall be made whenever the slump is shown to be out of control or excessive variation in workability is reported by the placing foreman. When the electric moisture meter is operating satisfactorily, at least two direct measurements of moisture content shall be made per week to check the calibration of the meter.

d. Moisture Content Corrective Action - Whenever the moisture content of the fine aggregate changes by 0.5 percent or more, the scale settings for the fine-aggregate batcher and water batcher shall be adjusted (directly or by means of a moisture compensation device) if necessary to maintain the specified slump.

3.9.2.2 Coarse Aggregate

a. Grading - At least once during each shift in which the concrete is being delivered, there shall be a sieve analysis in accordance with ASTM C 136 for each size of coarse aggregate. The location at which samples are taken may be selected by the Contractor as the most advantageous for production control. However, the Contractor shall be responsible for delivering the aggregate to the mixer within specification limits. A test record of samples of aggregate taken at the same locations shall show the results of the current test as well as the average results of the five most recent tests including the current test. The Contractor may adopt limits for control which are coarser than the specification limits for samples taken at locations other than as delivered to the mixer to allow for degradation during handling. Results of tests shall be reported in writing.

b. Corrective Action for Grading - When the amount passing any sieve is outside the specification limits, the coarse aggregate shall be immediately resampled and retested. If the second sample fails on any sieve, that fact shall be reported to the Contracting Officer. Where two consecutive averages of five tests are outside specification

limits, the operation shall be considered out of control and shall be reported to the Contracting Officer. Concreting shall be stopped and immediate steps shall be taken to correct the grading.

c. Coarse Aggregate Moisture Content - A test for moisture content of each size group of coarse aggregate in accordance with ASTM C 566 shall be made at least once per shift. When two consecutive readings for smallest size coarse aggregate differ by more than 1.0 percent, frequency of testing shall be increased to that specified above for fine aggregate, until the difference falls below 1.0 percent. These results shall be used to adjust the added water in the control of the batch plant.

d. Coarse Aggregate Moisture Corrective Action - Whenever the moisture content of any size of coarse aggregate changes by 0.5 percent or more, the scale setting for the coarse aggregate batcher and the water batcher shall be adjusted if necessary to maintain the specified slump.

e. Deleterious Substances - When in the opinion of the Contracting Officer a problem exists in connection with deleterious substances in fine or coarse aggregates, tests shall be made in accordance with ASTM C 33 at a frequency not less than one per week. Results of tests shall be reported in writing.

f. Corrective Action for Deleterious Substances - When the results for a deleterious substance is outside the specification limits, the aggregate shall be immediately resampled and retested. If the second sample fails, that fact shall be reported to the Contracting Officer. Where material finer than the 0.075 mm sieve for coarse aggregate exceeds the specification limit, immediate steps, such as washing or other corrective actions, shall be taken to correct the grading.

3.9.2.3 Scales

a. Weighing Accuracy - The accuracy of the scales shall be checked by test weights prior to start of concrete operations and at least once every month for conformance with the applicable requirements of paragraph BATCHING EQUIPMENT. Such tests shall also be made as directed whenever there are variations in properties of the fresh concrete that could result from batching errors. Results of tests shall be reported in writing.

b. Batching and Recording Accuracy - Once a week the accuracy of each batching and recording device shall be checked during a weighing operation by noting and recording the required weight, recorded weight, and the actual weight batched. The Contractor shall confirm that the calibration devices described in paragraph BATCH PLANT for checking the accuracy of dispensed admixtures are operating properly. Results of tests shall be reported in writing.

c. Scales Corrective Action - When either the weighing accuracy or batching accuracy does not comply with specification requirements, the plant shall not be operated until necessary adjustments or repairs have been made. Discrepancies in recording accuracies shall be corrected immediately.

3.9.2.4 Batch-Plant Control

The measurement of all constituent materials including cementitious materials, each size of aggregate, water, and admixtures shall be continuously controlled. The aggregate weights and amount of added water shall be adjusted as necessary to compensate for free moisture in the aggregates. The amount of air-entraining agent shall be adjusted to control air content within specified limits. A report shall be prepared indicating type and source of cement used, type and source of pozzolan used, amount and source of admixtures used, aggregate source, the required aggregate and water weights per cubicmeter yard, amount of water as free moisture in each size of aggregate, and the batch aggregate and water weights per cubic meter for each class of concrete batched during plant operation. The report shall be submitted to the Contracting Officer.

3.9.2.5 Concrete Mixture

a. Air Content Testing - At least two sets for air content shall be made on randomly selected batches of each separate concrete mixture produced during each 8-hour period of concrete production. Additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government quality assurance representative. Tests shall be made in accordance with ASTM C 231. For concrete having a nominal maximum aggregate size of 25 or 37 mm, the average is set at 5.5 percent and the upper and lower control limits at 7 and 4 percent respectively. For concrete having a nominal maximum aggregate size of 19 mm, the average shall be set at 6.0 percent and the upper and lower control limits at 7.0 and 5.0 percent, respectively. The control charts shall be submitted to the Contracting Officer.

b. Air Content Corrective Action - Whenever points on the control chart for percent air reach either warning limit, an adjustment shall immediately be made in the amount of air-entraining admixture batched. As soon as is practical after each adjustment, another test shall be made to verify the result of the adjustment. Whenever a point on the control chart range reaches the warning limit, the admixture dispenser shall be recalibrated to ensure that it is operating accurately and with good reproducibility. Whenever a point on either control chart reaches an action limit line, the air content shall be considered out of control and the concreting operation shall immediately be halted until the air content is under control. Additional air content tests shall be made when concreting is restarted. All this shall be at no extra cost to the Government.

c. Slump Testing - At least two slump tests shall be made on randomly selected batches in accordance with ASTM C 143/C 143M for each separate concrete mixture produced during each 8-hour or less period of concrete production each day. Also, additional tests shall be made when excessive variation in workability is reported by the placing foreman or Government's quality assurance representative. The average of each set of two tests shall be plotted on a control chart on which the upper and lower limits are set 38 mm above and below the mid-range valve. The range shall be plotted on a control chart on which the upper control limit is 75 mm. The control chart shall be submitted to the Contracting Officer.

d. Slump Corrective Action - Whenever points on the control chart for slump reach the upper warning limit, an adjustment shall be immediately made in the batch weights of water and fine aggregate. The adjustments are to be made so that the total water content does not exceed that

amount allowed by the maximum W/C specified, based upon aggregates which are in a saturated surface-dry condition. When a single slump reaches the upper or lower action limit, no further concrete shall be delivered to the placing site until proper adjustments have been made. Immediately after each adjustment, another test shall be made to verify the correctness of the adjustment. Whenever two consecutive slump tests, made during a period when there was no adjustment of batch weights, produce a point on the control chart for range at or above the upper action limit, the concreting operation shall immediately be halted and the Contractor shall take appropriate steps to bring the slump under control. Also, additional slump tests shall be made as directed. All this shall be at no additional cost to the Government.

e. Temperature - The temperature of the concrete shall be measured when compressive strength specimens are fabricated. Measurement shall be in accordance with ASTM C 1064/C 1064M. The temperature shall be reported along with the compressive strength data.

f. Compressive-Strength Specimens - At least one set of test specimens shall be made each day on each different concrete mixture placed during the day. Additional sets of test cylinders shall be made, as directed by the Contracting Officer, when the mixture proportions are changed or when low strengths have been detected. A random sampling plan shall be developed by the Contractor and approved by the Contracting Officer prior to the start of construction. The plan shall assure that sampling is done in a completely random and unbiased manner. A set of test specimens for concrete with a 28-day specified strength per paragraph DESIGN REQUIREMENTS shall consist of four cylinders, two to be tested at 7 days and two at 28 days. Test specimens shall be molded and cured in accordance with ASTM C 31/C 31M and tested in accordance with ASTM C 39/C 39M. All compressive-strength tests shall be reported immediately to the Contracting Officer. Quality control charts shall be kept for individual strength tests, moving average for strength, and moving average for range for each mixture. The charts shall be similar to those found in ACI 214.

g. Batch Tickets - The manufacturer of the concrete shall furnish to the Government's Quality Assurance representative with each batch of concrete, before unloading at the site, a delivery ticket prepared in accordance with the requirements of ASTM C 94/C 94M.

3.9.2.6 Inspection Before Placing

Foundation or construction joints, forms, and embedded items shall be inspected for quality by the Contractor in sufficient time prior to each concrete placement to certify to the Contracting Officer that they are ready to receive concrete. The results of each inspection shall be reported in writing not less than 2 hours prior to placement or by 4:00 p.m. for placements prior to 9:00 a.m. the following day.

3.9.2.7 Placing

a. Placing Inspection - The placing foreman shall supervise all placing operations, shall determine that the correct quality of concrete or grout is placed in each location as directed and shall be responsible for measuring and recording concrete temperatures and ambient temperature hourly during placing operations, weather conditions, time of placement, volume placed, and method of placement.

A report shall be submitted in writing to the Contracting Officer.

b. Placing Corrective Action - The placing foreman shall not permit batching and placing to begin until he has verified that an adequate number of vibrators in working order and with competent operators are available. Placing shall not be continued if any pile of concrete is inadequately consolidated. If any batch of concrete fails to meet the temperature requirements, immediate steps shall be taken to improve temperature controls.

3.9.2.8 Vibrators

a. Vibrator Testing and Use - The frequency and amplitude of each vibrator shall be determined in accordance with COE CRD-C 521 prior to initial use and at least once a month when concrete is being placed. Additional tests shall be made as directed when a vibrator does not appear to be adequately consolidating the concrete. The frequency shall be determined at the same time the vibrator is operating in concrete with the tachometer held against the upper end of the vibrator head while almost submerged and just before the vibrator is withdrawn from the concrete. The amplitude shall be determined with the head vibrating in air. Two measurements shall be taken, one near the tip and another near the upper end of the vibrator head and these results averaged. The make, model, type, and size of the vibrator and frequency and amplitude results shall be reported in writing.

b. Vibrator Corrective Action - Any vibrator not meeting the requirements of paragraph VIBRATORS shall be immediately removed from service and repaired or replaced.

3.9.2.9 Curing

a. Moist-Curing Inspections - At least once per day an inspection shall be made of all areas subject to moist curing. The surface moisture condition shall be noted and recorded.

b. Moist-Curing Corrective Action - When a daily inspection report lists an area of inadequate curing, immediate corrective action shall be taken, and the required curing period for such areas shall be extended by one (1) day.

c. Membrane-Curing Inspection - No curing compound shall be applied until the Contractor's authorized representative has verified that the compound is properly mixed and ready for spraying. At the end of each operation, he shall estimate the quantity of compound used by measurement of the container and the area of concrete surface covered and compute the rate of coverage in square meters per liter. He shall note whether or not coverage is uniform.

d. Membrane-Curing Corrective Action - When the coverage rate of the curing compound is less than that specified or when the coverage is not uniform, the entire surface shall be sprayed again.

e. Sheet-Curing Inspection - At least once each day an inspection shall be made of all areas being cured using material sheets. The condition of the covering and the tightness of the laps and tapes shall be noted and recorded.

f. Sheet-Curing Corrective Action - When a daily inspection report lists any tears, holes, or laps or joints that are not completely closed, the tears and holes shall promptly be repaired or the sheets replaced, the joints closed, and the required curing period for those areas shall be extended by one (1) day.

3.9.2.10 Cold-Weather Protection and Sealed Insulation Curing

At least once each shift and once per day on nonwork days, an inspection shall be made of all areas subject to cold-weather protection. The protection system shall be inspected for holes, tears, unsealed joints, or other deficiencies that could result in damage to the concrete. Special attention shall be taken at edges, corners, and thin sections. Any deficiencies shall be noted, corrected, and reported. During removal of Cold-Weather Protection, measurement of concrete and ambient temperature shall be made at least hourly. A report shall be submitted in writing to the Contracting Officer.

3.9.2.11 Cold-Weather Protection Corrective Action

When a daily inspection report lists any holes, tears, unsealed joints, or other deficiencies, the deficiency shall be corrected immediately and the period of protection extended 1 day.

3.9.2.12 Mixer Uniformity

a. Stationary Mixers - Prior to the start of concrete placing and once every 6 months when concrete is being placed, uniformity of concrete mixing shall be determined in accordance with ASTM C 94/C 94M. Whenever adjustments in mixer or increased mixing times are necessary because of rapture of any mixer to comply, the mixer shall be retested after adjustment. Results of tests shall be reported in writing.

b. Truck Mixers - Prior to the start of concrete placing and at least once every 6 months when concrete is being placed, uniformity of concrete shall be determined in accordance with ASTM C 94/C 94M. The truck mixers shall be selected randomly for testing. When satisfactory performance is found in one truck mixer, the performance of mixers of substantially the same design and condition of the blades may be regarded as satisfactory. Results of tests shall be reported in writing.

3.9.2.13 Mixer Uniformity Corrective Action

When a mixer fails to meet mixer uniformity requirements, either the mixer shall be removed from service on the work, the mixing time shall be increased, batching sequence changed, batch size reduced, or adjustments shall be made to the mixer until compliance is achieved.

3.9.3 Reports

All results of tests or inspections conducted shall be reported informally as they are completed and in writing daily. A weekly report shall be prepared for the updating of control charts covering the entire period from the start of the construction season through the current week. During periods of cold-weather protection, reports of pertinent temperatures shall be made daily. These requirements do not relieve the Contractor of the

obligation to report certain failures immediately as required in preceding paragraphs. Such reports of failures and the action taken shall be confirmed in writing in the routine reports. The Contracting Officer has the right to examine all test and inspection records.

3.10 PAVEMENT PROTECTION

The Contractor shall protect the pavement against all damage prior to final acceptance of the work. Traffic shall be excluded from the new pavement. As a construction expedient operation of the hauling equipment will be permitted on the new pavement after the pavement has been cured for 14 days and the joints have been sealed or otherwise protected. All new and existing pavement carrying construction traffic or equipment shall be continuously kept completely clean.

-- End of Section --

SECTION 05500

MISCELLANEOUS METAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36/A 36M	(1997ael) Carbon Structural Steel
ASTM A 48	(1994ael) Gray Iron Castings
ASTM A 53/A 53M	(1999b) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 123/A 123M	(1997ael) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 320/A 320M	(1999) Alloy Steel Bolting Materials for Low-Temperature Service
ASTM A 467/A 467M	(1998) Machine and Coil Chain
ASTM B 32	(1996) Solder Metal
ASTM B 221	(1996) Aluminum and Aluminum-Alloy Bar, Rod, and Wire
ASTM C 478	(1997) Precast Reinforced Concrete Manhole Sections
ASTM C 497	(1998) Test Methods for Concrete Pipe, Manhole Sections, or Title

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	(2000) Structural Welding Code - Steel

ASME INTERNATIONAL (ASME)

ASME B16.3	(1998) Malleable Iron Threaded Fittings
ASME B18.2.1	(1996) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(1987; R 1993) Square and Hex Nuts (Inch Series)

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1923 (Rev A) Shield, Expansion (Lag, Machine and Externally Threaded Wedge Bolt Anchors)

UNIFORM STANDARD DRAWINGS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA

NEVADA DEPARTMENT OF TRANSPORTATION STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Miscellaneous Metal Items; GA.

Detail drawings indicating material thickness, type, grade, and class; dimensions; and construction details. Drawings shall include catalog cuts, erection details, manufacturer's descriptive data and installation instructions, and templates. Detail drawings for the following items: trash rack structure, stilling well safety cage, stilling well access door, plates, and appurtenances, access gates, and staff gages.

1.3 GENERAL REQUIREMENTS

The Contractor shall verify all measurements and shall take all field measurements necessary before fabrication. Welding to or on structural steel shall be in accordance with AWS D1.1. Items specified to be galvanized, when practicable and not indicated otherwise, shall be hot-dip galvanized after fabrication. Galvanizing shall be in accordance with ASTM A 123/A 123M as applicable. Exposed fastenings shall be compatible materials, shall generally match in color and finish, and shall harmonize with the material to which fastenings are applied. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Thickness of metal and details of assembly and supports shall provide strength and stiffness. Joints exposed to the weather shall be formed to exclude water.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 General

Materials indicated on the drawings or required in the work and not covered elsewhere by detailed requirements shall conform to the requirements of this section. In all cases not specifically covered in these specifications, the Contractor shall furnish approved highest grade commercial materials or products which are suitable for the intended use of

the item.

2.1.2 Structural Shapes and Plates

Steel bars, shapes and plates shall conform to ASTM A 36/A 36M. Galvanized coatings where required, shall conform to ASTM A 123/A 123M.

2.1.3 Wall Ladders Rungs (Galvanized)

Manhole steps shall conform to ASTM C 478 and ASTM C 497. Aluminum steps shall be solid made from material in conformance with ASTM B 221 (Alloy 6005-TS). Reinforced plastic steps may only be used in manholes or other locations not exposed to sunlight and shall be polypropylene plastic coated 10 mm deformed steel rod per ASTM A 36/A 36M. All steps shall be epoxied in place during the installation process.

2.1.4 Corrosion-Resisting Steel Bolts and Anchor Bolts

Corrosion-resisting steel bolts and anchor bolts shall conform to the applicable requirements of ASTM A 320/A 320M, Grade B8.

2.1.5 Bolts

Bolts shall conform to ASME B18.2.1 and to the applicable requirements of ASTM A 320/A 320M, Grade B8. The turned eye bolt shall have a 19 mm eye size, leg length of 100 mm and at least 3 mm thick.

2.1.6 Nuts

Nuts shall conform to ASME B18.2.2. Nuts shall be galvanized.

2.1.7 Expansion Anchors

Expansion anchors shall conform to the applicable requirements of CID A-A-1923. Anchors shall be multiple unit with inside thread.

2.1.8 Concrete, Mortar and Grout

Cast-In-Place Structural Concrete, mortar and grout shall conform to the requirements of Section 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS.

2.1.9 Pipe Safety Railing

Safety railing and anchors shall be fabricated as shown on the drawings. Anchors, nuts and washers shall be galvanized.

2.1.10 Steel Pipes

Steel pipe shall conform to ASTM A 53/A 53M, Type E or S, Grade A, galvanized nominal size and weight unless noted otherwise.

2.1.11 Pipe Caps

Pipe caps shall conform to ASME B16.3.

2.1.12 Trash Rack Gratings

Trash rack gratings shall be fabricated of steel conforming to ASTM A 36/A 36M and steel pipe conforming to ASTM A 53/A 53M standard weight.

2.1.13 Cover Plate

Cover plates shall conform to plans. Sharp edges and burrs shall be removed from plates.

2.1.14 Manhole Frames and Covers

Locking manhole frames and covers shall be ductile iron Pont-A-Mousson Paris S or approved equal. Wrench for lock nut shall be provided to the Contracting Officer by the Contractor. Other frames and covers are to be Gray Iron Castings, Type A-1497 as manufactured by Alhambra Foundry Co. Ltd. or approved equal. Castings for manhole frames and covers shall conform to ASTM A 48, Class 30. Frame and cover shall be machined to fit. Lids shall be imprinted with the words "Clark County Public Works Storm Drain".

2.1.15 Inlets and Frames

Square beehive drainage inlets and frames are to be Gray Iron Castings, Type R-4346 as manufactured by Neenah Foundry Company or approved equal. Castings for inlets and frames shall conform to ASTM A 48, Class 30.

2.1.16 Steel Chain Gate

Chain safety gate shall be manufactured from 6 mm diameter carbon steel coil in accordance with ASTM A 467/A 467M.

2.1.17 Stilling Well Ladder and Safety Cage

Ladder and cage shall be detailed and submitted for approval prior to fabrication. Full dimensions, wall and floor attachments, materials, construction and finish must be shown. All edges shall be clean, smooth, burr-free and rounded.

a. Rungs shall be no less than 31.7 mm in section and 466.7 mm long, formed from tubular aluminum extrusions, alloy 6063-T6 or 6005-T5, shall be squared and deeply serrated on all sides, and shall be at 305 mm intervals. Rungs shall be able to withstand a 450 kg load without failure.

b. Side rails shall be aluminum channel no less than 3.2 mm wall thickness by 76.2 mm wide.

c. Safety cage shall be fabricated for 4.8 mm by 50.8 mm aluminum bar, alloy 6063-T5 or 6005-T5. Cage hoops shall have 342.9 minimum radius. Safety cage shall end a minimm of 2.13 and a maximum of 2.44 meters above the bottom of the ladder.

d. Platform shall be provided at maximum interval of 9.144 meters with deck of serrated aluminum treads.

e. Wall mounting brackets shall be aluminum no less than 50.8 mm by 4.76 mm.

f. Floor mounting brackets shall be aluminum, angle no less than 101.6 by 50.8 mm by 4.76 mm.

2.1.18 Steel Sleeves

Steel sleeves for future utilities shall be steel pipe conforming to ASTM A 53/A 53M, Class B. Diameters shall be as shown on the plans. The minimum thickness shall be 6 mm.

PART 3 EXECUTION

3.1 WORKMANSHIP

Miscellaneous metalwork shall be well formed to shape and size, with sharp lines and angles and true curves. Drilling and punching shall produce clean true lines and surfaces. Welding shall be continuous along the entire area of contact except where tack welding is permitted. Steel with welds will not be accepted, except where welding is definitely specified or called for on the drawings. All bolts, nuts, and screws shall be tight. Work shall be accurately set to established lines and elevations and securely fastened in place. Anchorage shall be provided where necessary for fastening miscellaneous metal and wood items securely in place. Anchorage not otherwise specified or indicated shall include slotted inserts made to engage with the anchors, expansion shields, and power-driven fasteners when approved for concrete; machine and carriage bolts for steel; and lag bolts and screws for wood.

3.2 FINISHING

In general, tolerances for machine-finished surfaces designated by nondeciaml dimensions shall be within 0.4 mm. Sufficient machining stock shall be allowed on placing pads to insure true surfaces of solid material. Finished contacts of bearing surfaces shall be true and exact to secure full contact. All drilled holes for bolts shall be accurately located and drilled from templates.

3.3 ZINC COATING (GALVANIZING)

Zinc coatings shall be applied in a manner and of a thickness and quality conforming to ASTM A 123/A 123M. All exposed ferrous metalwork, except cast-iron and corrosion resistant steel and items to be completely embedded in concrete, shall be galvanized unless other protective coatings are specified. Metalwork shall be galvanized after fabrication. In the event that any portion of galvanized metalwork is abraded or otherwise damaged to the extent that the base metal is exposed, such damaged or abraded portions shall be neatly covered with Grade 50B solder conforming to the requirements of ASTM B 32.

3.4 WELDING

Welding shall conform to the provisions of AWS D1.1. Welders who have not been certified within two years of the date of commencement of work under this contract will not be allowed to perform the work.

3.5 BOLTED CONNECTIONS

Bolt holes shall be reamed normal to the member and shall be truly

cylindrical throughout. Unless otherwise specified, holes for bolts shall not be more than 1.60 mm larger than the diameter of the bolt. Cutting bolt holes with a torch will not be permitted without the prior written approval of the Contracting Officer. Materials and parts necessary to complete each item, even though such work is not definitely shown or specified, shall be included. Poor matching of holes for fasteners shall be cause for rejection. Fastenings shall be concealed where practicable.

3.6 EXCAVATION

Excavation for concrete-embedded items shall be of the dimensions indicated on the drawings. Holes shall be cleared of loose materials prior to placement of concrete.

3.7 PIPE SAFETY RAILING

Pipe Safety Railing shall be fabricated with steel pipe and shall be fabricated in the shop. Care shall be taken to deform pipe without "breaking" the steel. Any pipe deformations that demonstrate visible cracking or weakening may be cause for rejection. **The completed Pipe Safety Railing assembly shall be galvanized after shop fabrication.** The pipe gate components shall be galvanized. Welded, cut, damaged, and deformed areas of galvanizing metal shall be neatly coated with Grade 50B solder conforming to ASTM B 32. The Contractor shall grease pipe slip joint thoroughly with grease immediately after installation of chains at each gate opening. The Contractor shall examine and certify the operation of all safety pipe railing not sooner than 30 days after installation.

3.7.1 Attachment of Safety Railing

Splices, where required, shall be made at expansion joints. Removable sections shall be installed as indicated.

3.7.2 Installation of Pipe Safety Railing

Installation shall be as shown on the drawings.

3.8 ACCESS GATE

Access gates shall be installed at the locations indicated on the drawings. Access gates shall be fabricated in the shop from standard weight steel pipe conforming to ASTM A 53/A 53M. All access gate components shall be galvanized after fabrication. Welded, cut, damaged, and deformed areas of galvanizing metal shall be neatly coated with Grade 50B solder conforming to ASTM B 32. The gates shall be installed in such a fashion that they work freely. The Contractor shall examine the operation of all pipe gates not sooner than 30 days after installation for ease of operation. Any gates that cannot be operated by one person will be repaired (including any required structural modifications) by the Contractor at no additional cost to the Government, and requirements for repair shall conform to the requirement for installation above.

3.9 TRASH RACK

Trash rack gratings shall be of the type and size specified or shown on the drawings and shall be fabricated to accurately fit the supporting member. Opening shall be provided as shown on the drawing or as required. Trash

rack grating and connections shall be galvanized after fabrication.

3.10 SEDIMENT STAFF GAGES AND PIPE BOLLARDS

Sediment staff gages and pipe bollards shall be fabricated with heavy duty steel pipe conforming to ASTM A 53/A 53M, Type E or S, weight STD, galvanized after fabrication as shown on the drawings. Sediment staff gages and pipe bollards shall be set vertically in concrete encasements. Concrete for encasements and pipe fill where indicated shall be as specified in SECTION 03301 CAST-IN-PLACE STRUCTURAL CONCRETE FOR CIVIL WORKS having a compressive strength of 21 MPa.

3.11 PAINTING

Painting of sediment staff gages, basin depth gage, and pipe bollards shall be in accordance with the requirements of the UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS' CONSTRUCTION OFF-SITE IMPROVEMENTS, CLARK COUNTY AREA NEVADA, SECTIONS 614 AND SECTION 714.

3.12 STILLING WELLS

3.12.1 Steel Cover Plates and Frames

Steel cover plates and frames shall be of the type and size specified or shown on the drawings and shall be fabricated to accurately fit the supporting member. Openings shall be provided as shown on the drawings or as required. Steel cover plates and frames shall be galvanized after fabrication.

3.12.2 Ladder and Safety Cage

Ladder and safety cage shall be installed per manufacturer's recommendations.

3.13 Steel Sleeves

Steel sleeves shall be placed to the alignment and grades indicated and in accordance with SECTION 02316 EXCAVATION, TRENCHING AND BACKFILLING FOR UTILITIES SYSTEMS.

-- End of Section --